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ABSTRACT

This report addresses two central questions raised by the rapidly changing economic role of American women during the 20th century. First, why have the reported wages of women remained constant at approximately 59 percent of men's wages, in spite of the enormous increase in the numbers of women who work and who presumably have been acquiring valuable market experience? Second, what accounts for the remarkable growth in the proportion of women who work? The report demonstrates that the constancy of women's relative wages at the 59 percent level is a myth. Women's wages are not 59 percent of those of men--they are even lower. But women's wages have in fact risen in response to their expanded skills, as well as their increased years of education and work experience. Throughout the 20th century, women's wages have been rising much faster than men's wages and will continue to do so into the foreseeable future. In answer to the second question, the report contends that the female labor force has grown at such a spectacular rate during this century, first of all, because of structural changes in the labor market, and more important, because of rising women's wages, which have attracted more women into the work force. (This report first discusses the issue of trends in women's wages and then summarizes findings documenting the reasons for the growth in the female labor force. An executive summary is provided.) (KC)

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Women's Wages and Work in the Twentieth Century

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Prepared for the National Institute
of Child Health and Human Development

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PREFACE

This research was funded by Grant Nos. 1 R01 HD17357-01 and 1 R01 HD-15811-01A1 from The National Institute of Child Health and Human Development. It considers the issue of the constancy of women's reported relative wages at the 59 percent level and seeks explanations for the notable growth in the proportion of women who work. The findings should be of interest to scholars of the rapidly changing role of women in the labor force and to policymakers dealing with legislation that considers gender.

SUMMARY

This report addresses two central questions raised by the rapidly changing economic role of American women during the twentieth century. First, why have the reported wages of women remained constant at approximately 59 percent of men's wages, in spite of the enormous increase in the numbers of women who work and who presumably have been acquiring valuable market experience? Second, what accounts for the remarkable growth in the proportion of women who work?

Many people have rightly expressed concern about the apparent fixity of women's wages at this 59 percent level. Government statistics suggest that this level has persisted for decades and perhaps a good deal longer. Indeed, some observers, only half in jest, even point to Old Testament passages suggesting that a similar wage disparity prevailed during Biblical days. The concern expressed is legitimate. If true, the constancy of this wage ratio suggests an inflexible labor market that has failed to reward the obviously increasing skill of women as more of them have entered the labor market and more have stayed in it. It is not difficult to deepen this pessimism by extrapolating to a future that will continue to maintain a rigid wage structure by gender in spite of the even greater numbers of women who work and the more committed career goals of these women. Such pessimism is one reason that some have called for a massive governmental and judicial intervention into American labor markets in order to eradicate wage disparities between the sexes.

This report demonstrates that the constancy of women's relative wages at the 59 percent level is a myth. Women's wages are not 59 percent of those of men--they are even lower. But women's wages have in fact risen in response to their expanded skills. Throughout the twentieth century, women wages have been rising much faster than men's wages and will continue to do so into the foreseeable future.

The second question we address is why the female labor force grew at such a spectacular rate during this century. The traditional division of labor within the family, with the husband as sole wage-

earner and the wife as homemaker has all but vanished. But the reasons for the increasing feminization of the American labor market are not well understood. There is a temptation to emphasize explanations that rely on events that are very visible in our own time. One such explanation contends that society has been rapidly changing its attitudes toward what constitutes "women's work" and the "proper role" of women. These changes, it is thought, were partly induced by the women's movement in the last few decades. The more historically minded may argue that World War II, during which women worked in unprecedented numbers, served as the catalyst that permanently altered women's (and men's) view of women at work. However, although these factors may have quickened the pace of women's entry into the labor market, we will show that other developments, which lie far deeper in American history, have been the real driving forces. Structural labor market changes during the first two decades of this century actually provided the fundamental impetus. Moreover, rising women's wages--often downplayed or ignored owing to the preeminence of the 59-percent figure--have played a far more significant role in attracting women into the workforce than is commonly believed.

Although our two questions are obviously interrelated, we will deal with them sequentially in this summary. We first discuss the issue of trends in women's wages and then summarize our findings documenting the reasons for the growth in the female labor force.

WHAT HAS HAPPENED TO WOMEN'S WAGES

Our research on women's wages reaches four principal conclusions: (1) The wages of working women did not increase relative to those of working men between 1920 and 1980 because the skill (as measured by education and experience) of working women did not increase relative to the skill of men over this period. (2) The average wages of the entire population of women, however, have increased much faster than the wages of men during the last 60 years. At the same time, the market skills of the entire population of women have risen much more rapidly than the skills of all men. (3) Although largely unrecognized, women's wages relative to men's jumped by a large amount between 1980 and 1983. And (4) defined either over the female workforce or the entire population of women, the economic status of women is going to improve significantly relative to that of men over the next 20 years.

To see how we reached these conclusions, it is important to be aware of two considerations: first, the distinction between the female workforce and the female population, and second, the relation of wages to labor market skills.

On the first point, people are often not aware that every government-reported wage series measures wages only for those who are currently working. Since over 95 percent of men aged 20 to 64 are currently working, the distinction between the male workforce and male population is not important--for all practical purposes they are the same. Consequently, the average wage of currently working men is a good measure of the mean wage of the male population.

However, the same is not true for women. Reported women's wages in 1983 represent the average wage only for the 63 percent of women who were working at the time. Similarly, the reported wage of women in 1920 is the average wage only for those 20 percent of women who were then in the labor market.

These average wages of working women are not good predictors of the wages of the entire population of women. For example, working women differ systematically from housewives in their education and the amount of their job experience. For this reason alone, the wages of working women will differ from the wages of all women. We have developed in this report a method of calculating the wages housewives would earn if they joined the labor market. Based on this methodology, we are able to calculate changes over time in the wages of the population of women rather than simply the wages of women who are currently workers.

Knowing the wages of all women is important, because trends in wages of working women can produce misleading results. The reason is that as the fraction of women working increases from 20 percent levels to those over 60 percent, the base on which the average wage of the workforce is calculated changes. If the new labor market entrants have less skill than the women who are already working, they will lower the average wage of working women. In an extreme case, if all housewives suddenly became workers, the average wage of women in the workforce would necessarily fall even though the wage of the population of women is unchanged. While this is an hypothetical example, in less extreme form this is what actually happened as participation rates of women increased over time. With that in mind, we derived relative wage series for the female workforce and for the entire female population.

We began by tracing what has happened to wages of *working* women during the twentieth century. Our review suggests that we can divide this century into three distinct periods: 1890 to 1920, long-term trends between 1920 and 1980, and some quite recent and remarkable developments that have occurred since 1980--developments that point to an optimistic future over the rest of this century for women's wages.

- Our long-term series implies that, relative to men, working women's income increased rather sharply--16 percent--from 1890 to 1920. The principal reason was the emergence of clerical employment. From about 1900 to 1915, the clerical sector was transformed from a minor part of the female workforce to one employing more than one in every three new female workers. It opened up a whole new set of jobs to women, which lessened the conflict between work and marriage and permanently raised the wages women could earn.
- We made what may be a surprising discovery to some that working women's wages relative to those of men were slightly lower in 1980 than they were in 1920: 60 percent as opposed to 63 percent, according to our best estimate. Within this 60-year time span there is a slight U-shape in the trends over time in working women's wages. Across all ages, there was a slow downward drift in the ratio of female-to-male wages until the mid-1970s. For example, hourly wages of working women leveled off at 57 percent of men's wages in 1976, but thereafter rose somewhat more rapidly than those of men. These recent wage gains were concentrated among women aged 35 and younger. For example, in 1972, among those 25 to 34 years old, hourly wages of working women were 65 percent of males. By 1980, they reached 69 percent.

- Some dramatic improvements in working women's wages have taken place since 1980. In 1980, women's hourly wages were 60 percent of those of men; by 1984, the figure had risen to 64 percent--the largest and swiftest gain that we measured using any of our series during this century. In terms of real purchasing power, the hourly wages of women rose 3.3 percent over this period while the wages of men adjusted for inflation declined by 3 percent. These recent wage gains were particularly large among younger women. In 1980, women 20 to 24 years old earned 78 percent as much as men of that age. By 1983, this ratio had risen to 86 percent. Similarly, women 25 to 34 years old received 69 percent of the wage of men in that age group. By 1983, this ratio had reached its historic high at 73 percent. There is also some evidence that the wage gains have been somewhat larger among college graduates than among women with less schooling.
- When we stratify our data by race, we find that black women made significant wage gains relative to white men during the years 1950-1980. Since 1956, their hourly wages have increased 47 percent more rapidly than those of white men. In 1956, the typical working black woman earned one-third the wage of all white men; by 1980, this ratio had risen to 57 percent. But the contrast between black women and white women is most extraordinary. In 1956, the average black woman earned about half the wage of a similarly employed white woman. By 1980, the disparity between black and white women had almost vanished.

All the wage series described thus far are comparisons of *working* women relative to *working* men. Such comparisons are in fact the conventional method of comparing men's and women's wages and thus underlie all government-reported statistical series. That method, however, as we will demonstrate, seriously distorts the actual trends in the economic status of *all* women relative to *all* men.

To derive the wages of all women, we had to construct skill distributions for all labor market cohorts of women. Skills are obviously multi-faceted and complex, but we deal only with two important aspects. The skill distributions we constructed have two dimensions of skill: years of schooling and years of labor market experience. We derived these skill distributions for both the female workforce and the female population. Our indexes show that convergence--or lack of convergence--between the sexes in these skill-related characteristics among people who are working *now* differs greatly from trends in market-related skills of *all* men and women, evaluated regardless of whether they are or are not currently in the workforce. Among current workers, there is little evidence that either skill or wage disparities between men and women have narrowed over time. However, skill differences by sex in the entire population have converged, especially in the last decade.

Education

Numerous studies have demonstrated that wages for both men and women increase with additional schooling. With this in mind, the first skill dimension we examined for the population and workforce was education. We found that:

- During the century, the education of the male population has been rising faster than the female. For example, if we compare people born between 1946 and 1950 with those born between 1911 and 1915, we find that men's average schooling rose by 2.8 years, but women's by only 2.3 years. On this dimension, men's skill has increased faster than women's. This additional one-half year of schooling advantage in favor of men is due principally to the fact that men received college education in greater numbers and much earlier than women did.
- This male advantage becomes even larger when we monitor trends in the education of the *workforce*. Between 1940 and 1970, more less-educated women than better-educated women entered the workforce. The educational level therefore increased less in

the female workforce than in the population of women, and as a further consequence, male schooling among white *workers* rose by almost one year more than the schooling of female workers.

Work Experience

Because skills are acquired on the job as well as in schools, we also examined trends over time in the labor market experience of the female workforce and female population. The distinction between the two is even more critical when we examine the experience dimension of skill. As female participation rates have increased rapidly over time, many of the new workers in the labor force consist of women who had never worked or women who worked only sporadically in the past. Therefore, they brought with them little or no prior work experience. Nonetheless, they become part of the labor-force base in computing average experience. Because of this, the average experience of the female workforce can decline even as women's total experience is rising.

Our work in this report demonstrates that most of the increase in the female labor force has been due to the entry of women who were previously housewives with little prior experience. It has not been due to a greater commitment to the labor force by women who were already in it. Despite the enormous increase in numbers of women working, women workers exhibit the same labor force attachment (the length of time they will stay in the labor market) in 1980 as in 1920. Snapshops of the female workforce in 1920 and 1930 would look amazingly similar to those in 1950 and 1980.

- The consequence is that the average experience of the female workforce has changed little over the last 60 years, while the average labor market experience of all women is rising. For example, the average 40-year-old *working* woman in 1950 had 14 years of prior work experience. Her counterpart in 1980 had acquired only 14.4 years--an increase of less than half a year in 30 years. This finding intensifies when we penetrate further into the past. According to our simulations, such a 40-year-old female worker in 1930 had accumulated 15.4 years of work experience--a full year more than her successors.

- In contrast, there was a significant increase in the average experience of all women, calculated independently of whether they were currently working or not. For example, the average 40-year-old woman in 1950 had 8.1 years of work experience; in 1980, the figure was 11.4, an increase of 3.3 years. Taking a longer view, between 1930 and 1980, there was almost a 5-year incremental gain in the total number of years worked for the average 40-year-old woman (from 6.7 years in 1930 to 11.4 years in 1980).

These education and experience distributions were used to calculate the wages of the female workforce and the female population for all years between 1920 and 1980. In any year, the wages of all women will be less than the wages of currently working women for three reasons. First, working women have more education than women who are not working. Second, working women have more labor market experience than women who are not currently working. Third, for a host of other reasons, working women have more aptitude for work than nonworkers.

- Taking into account all three factors, we find that women on average would receive a lower hourly wage than the wage paid to the women who are currently in the labor market. To illustrate, we estimate that the hourly wage of all women in 1980 was 53 percent of the hourly wage of men, whereas the figure for working women was 60 percent.

The most important implication of our model concerns not so much differences in wage levels of all women compared with workers in any particular year, but the implication for trends over time in hourly wages of women. We used our education and experience distributions to answer two questions. First, why did the wage of working women relative to working men remained relatively constant between 1920 and 1980? Second, what was happening to the wages of all women relative to all men?

We mentioned above that the average wage of *working* women was 63 percent of men's wages in 1920 and in 1950, compared with 60 percent in 1980. But these figures are consistent with our finding that relative to men, skills of the typical female worker were actually higher in 1920 than in 1980. For example, compared with men, women workers lost one year of schooling and gained only half a year of work experience between 1950 and 1980. Thus, the stability in relative wages by sex among workers is consistent with the stability in their skills. In short, nothing new had happened to narrow the wage-disparity between men and women workers over the last 60 years.

But the story is quite different when we monitor trends in the wages of all women. The market skills of all women relative to all men were indeed increasing during this century. While the increase in education of all women was half a year less than the increase for men, there was a significant rise of 2 or 3 years in women's work experience. Converted to an hourly wage base, we estimate that in 1920 women earned 43 percent as much as men; by 1950, 48 percent as much; by 1980, 53 percent. Therefore, a correct description of the relative wage series would show a steady increase in women's wages relative to men. Across the 60 years between 1920 and 1980, women's wages grew 20 percent faster than men's wages.

The Increase in Women's Wages Between 1980 and 1983

We also investigated in this report some hypotheses that might explain the rapid rise in working women's wages that has taken place since 1980. By 1983, women's wages had risen to 64 percent of men's, up from the 60 percent figure that prevailed only three years earlier.

One explanation that does *not* fit is that government affirmative action pressures induced this recent improvement. The Civil Rights law that set up the principal mechanism for government enforcement, the Equal Employment Opportunity Commission (EEOC), was passed in 1964. It is difficult to argue that it would take 16 years for this legislation and commission to have its initial impact. If anything, the enforcement powers and the budgetary resources of the EEOC and the Office of Federal Contract Compliance Program (OFCCP) have declined during the last three years. A substantial number of economic studies have also found little effect of affirmative action on the average economic status of white women.

This recent improvement in women's wages is, however, consistent with the arguments we have advanced in this report. The sample composition effects caused by the entry of housewives into the labor market, which have camouflaged reality for some time, have essentially run their course. In contrast to the past, the work experience of the female workforce is now increasing rapidly; so is its education, which has risen faster than that of the male workforce. This is partly due to increased college attendance by women; but also, in recent years, female workforce participation rates have increased much faster among the more educated. These developments all point to the fact that women's market skills have been the primary shaper of their economic status in the past, and will be in the future, rather than legislation, government commissions, or political movements.

Women's Wages in the Year 2000

Women's wages in the workforce over the next twenty years will be far different from the past. We project that the skills of the typical female worker will increase sharply relative to males by the year 2000. First, in contrast to past trends, women's education will increase faster than men's. One reason is that women have been accelerating their rates of college attendance. In addition, market participation is now rising more rapidly among more educated women than among less educated women.

The average work experience of both the female workforce and the population will also increase significantly. By the year 2000, a 40-year-old working woman will have 5.2 more years of work experience than her counterpart had in 1980. As a result, we estimate that wages of working women will rise at least 15 percent faster than those of men over the next twenty years. If we use the current 64 percent as a base, the wages of working women will be at least 74 percent of male wages by the year 2000. This is a conservative estimate, because this added commitment to the labor market will also increase women's incentive to invest in market-related skills. We did not take that into account in our projection, and factoring it in implies even higher future ratios of women's wages. Similarly, we estimate that wages of all women will rise relative to those of men, reaching (conservatively) at least 66 percent by the year 2000. This is 50 percent higher than the wage ratio prevailing in 1920. The reason is that the labor market skills of the typical woman will be much greater relative to those of men than they are today. For example, by the time she is 40, the typical woman in the year 2000 will have worked for 15.6 years--over 4 years more than the typical 40-year-old woman in 1980.

WHY DID THE FEMALE LABOR FORCE GROW?

The second topic we address in this report is why the female labor force grew so persistently and rapidly during this century. The entry of women into the labor market represents one of the most important social changes in the American economy. Female labor force participation rates increased 50 percent from 1950 to 1970 and continued to grow at an accelerated rate during the 1970s. Moreover, this process had its antecedents well before World War II. During the first 40 years of this century, participation rates for white married women grew fivefold.

Our research highlights a number of important dimensions to the growth in the female labor force in this century:

- At the beginning of this century, fewer than one in five women were members of the labor force; by 1983, more than 6 in 10 were. The pace of change was much more rapid among white women. In 1900, only 17 percent of all white women aged 20 to 64 were in the labor market; by 1983, the figure was 63 percent. The corresponding figures for black women were 42 percent and 64 percent.
- The fact that the growth in the female labor force reflects trends across the entire twentieth century becomes even more evident when we look at white married women. In 1900, one in every 50 white married women was in the labor force. By 1950, the figure had increased tenfold to one in every five. By 1982, fully half of all white women were in the labor force.

The increases in participation of married women before World War II represent a far more fundamental restructuring of the female workforce than even the quite rapid increases in participation during the last decade.

- Even though it represents a continuation of past trends, the rate of increase in women's participation during the 1970s and early 1980s was spectacular. For American women 25 to 34 years old, participation rates have been rising by almost 2 percentage points a year.
- The age-shape of this rise in participation has changed significantly over time. Between 1890 and 1940, participation rates of young women 25 to 34 years old expanded by 17 percentage points (from 16.8 to 33.3 percent). Over the same time period, participation rates of women 45 to 54 increased by 10 percent (from 12.5 to 22.5 percent). This historical regularity ended in 1940, and for the next twenty years the age shape tilted towards older women. Between 1940 and 1960, participation rates actually declined for women under 35--the mothers of the baby-boom generation--but expanded enormously for women over 35. To illustrate, for women 45 to 54, participation rates in 1960 were 46.7 percent--more than double their level in 1940.
- After 1960, the age patterns of the earlier years of the century were repeated, but at a greatly magnified scale. In 1983, fully 7 in 10 women 25 to 34 years old were workers in a typical week, compared with slightly over 4 in 10 in 1960. Participation rates continued to increase for older women, but at a slower rate; the rates for women 45 to 54 rose by 14.4 percentage points between 1960 and 1983.
- In every year that we examined since 1940, female employment rose with education, particularly as women went beyond high school. However, the increases over time in participation within education groups were not uniform, and that has produced the compositional changes in the female workforce that we mentioned above in discussing wage trends. Between 1940 and 1970, the largest increases in market work took place among

less educated women. For example, among women 25 to 34 with 8 years of schooling, participation rates rose from 27 to 37 percent between 1940 and 1970. Among college-educated women 25 to 34 years old over the same time period, participation rates were basically constant. That trend reversed after 1970. Since that time the participation rates of more educated women have increased more rapidly. By 1979, the participation rate of college women in this group was 77 percent, while that of elementary-schooled women was 43 percent.

- Almost all the increase in women's work, at least since 1950, is a result of the increasing proportion of women who have entered the workforce. The average number of hours worked by the typical working woman has not changed. This is mainly because of an increase in the fraction of women who work at part-time jobs. Thus, despite weekly participation rates in excess of 60 percent, the average working woman still works under half the number of hours of an average man.

The Determinants of the Growth in Women's Work

In searching for determinants of the long-term growth in the fraction of women who work, we began by describing the principal characteristics of the labor market that women faced in 1900. By describing the structure of women's wages and labor supply in the first year of this century, we hoped to identify how that labor market must have been altered to enable the expansion in the number of women who joined the labor force.

The labor market in 1900 was not hospitable to working women, especially married women. In that year, marriage virtually precluded work by white women, with only 2 percent of such women in the labor force. One reason was that the wages married women could earn were far lower than those of comparably qualified single women--30 percent lower, by our estimates. The majority of married women who did work in 1900 were employed as domestic servants, jobs that offered at least some compatibility with their homemaking responsibilities.

Another important characteristic of the 1900 labor market was that working women were mostly less educated women and those whose husbands had low incomes or were unemployed. While even contemporary women are less likely to work as their husbands' income rises, all studies since 1940 show that the likelihood of women working increases with their education. Since this was not the case in 1900, the character of the labor market confronting women must have altered in some fundamental way that reversed the association of work with schooling.

The other deterrents to market work in 1900 that we identified were more conventional. Even in 1900, having large families reduced the likelihood of women working. So did living in families that extended across generations (e.g., with grandmothers and older daughters at home). Finally, women who lived on farms were less likely to be members of the paid labor force. In 1900, more than one-third of women lived on farms.

This 1900 labor market, which proved to be so inimical to women's work, changed significantly in succeeding decades. Beginning with women who entered the labor market from 1900 to 1920, participation rates grew much faster than they previously had. Our analysis points to several important structural changes in the labor market that women faced during this century. The most important was the previously mentioned sharp increase in women's wages between 1900 and 1920. Across these years, women's wages increased 16 percent faster than wages of men. At the same time, the 30 percent wage penalty for married women was gradually eliminated. By 1960, we find that there was very little difference in the women's wages across various marital categories. As we mentioned above, the principal reason for the sharp increase in women's wages in the early years of this century was the emergence of clerical employment.

Other factors also spurred the long-term increase in the number of women working. Coincident with the time period of the most rapid increase in female employment was a significant rise in school completion among women, largely due to a sharp rise in high school attendance. It is well established that women's employment increases with their education, especially with the completion of high school and attendance at college.

In addition, our research identified three demographic forces that contributed to the long-term growth in the female labor market: the increasing nuclearization of the American family, the urbanization of its population, and the long-term secular decline in fertility.

- In 1900, many families were extended across generations, with grandmothers and older daughters living in the same households with mothers. In terms of the range of productive activities taking place, these homes often resembled small cottage firms. As families became more nuclear during this century, the labor available for such work diminished and many of those activities shifted out of the home.
- Many women in 1900 lived on farms and many others resided in rural areas. Although these women often performed arduous tasks and worked long hours on the family farm, their work was so tied up with their homemaking duties that it was often impossible to distinguish home tasks from market work. Because of this, such women were not counted as members of the paid labor force. The decline of the family farm was an important contributor to the growth in the female labor force.
- Not surprisingly, declining levels of fertility of American women also played a part in the long-term entry of women into the labor force. Long-term fertility rates had been falling for generations, but starting in 1921 American women quickened this process, reducing their fertility by more than a third during the next 12 years. Birthrates reached historic lows during the Depression. Beginning in 1947, birthrates jumped and continued to rise until 1957 (the baby boom). Then the trend reversed, and birthrates fell until the mid-1970s, when they again hit record lows. In 1900, the typical woman had almost four children. By the 1970s, this rate had been cut in half, so that now American families are not even reproducing themselves. However, childbearing can easily be overrated as a cause of the long-run increase in women's work. For example, although women born between 1931 and 1935 had more children

(3.2) over their lifetime than women born between 1871 and 1895 (2.9), twice as many of them worked, on average.

A popular view is that World War II, during which women worked in unprecedented numbers, served as a catalyst that permanently altered men's and women's view of women at work. However, our analysis suggests that the situation was more complicated. For women who ended the war with their childbearing years behind them, World War II clearly had a legacy that lasted far beyond its conclusion. These women worked in far greater numbers than they would have without the intervention of the war. In contrast, the war had only a slight long-term effect on younger women. These women were caught up in the high-fertility years of the baby boom and their labor force participation rates were actually below historical trends. In large part, the rising labor market participation in the last two decades represents a return to pre-World-War II patterns that were temporarily interrupted by the postwar baby boom.

Finally, our analysis suggests that other demographic factors, such as the age, race, and marital status of the population, had very minor effects on the long-term growth in women's work. These factors, especially marital status, did affect the timing of the growth of participation, but in evaluating long-term trends they can be safely ignored.

For example, over the 50-year period between 1890 and 1940, women gradually married at somewhat younger ages. But the dominant trend took place after 1940, with a cycle in marriage rates of dramatic magnitude and swiftness. During the baby-boom years, the fraction of women who never married declined sharply, particularly for women under age 30. By 1980, however, marriage rates had almost returned to their 1890 levels.

The most important determinant of the growth in women's work during this century was the increase in their wages. Based on our model, we estimate that women will work more when their wages are high. Higher women's wages encourage work for two reasons. The rewards from work are greater when we earn more and higher women's wages encourage smaller families. Holding family size constant, a one percent increase in women's wages will increase their labor supply by one-third of one percent. However, this effect is much larger when we allow family size to adjust to the higher wage. Our estimates indicate that an increase in women's wages decreases the number of children. This decrease in family size also leads to more work by women. If we allow for this effect, a one percent increase in women's wages increases women's labor supply by eight-tenths of one percent. In contrast, we find that women are less likely to work as their husband's wages increase. However, the depressing effect of husband's wages on women's labor supply is much smaller than the encouraging effect of an increase in women's wages. Thus, as real wages rise over time, female labor supply should rise.

We conclude that real wages have played a significant part in the growth of the female workforce. One reason is that the postwar real wage growth among women has been much larger than commonly believed. Over the last three decades, the effect of rising wages explains almost 60 percent of the total growth in the female labor force. Half of this wage effect reflects the fact that incentives to work are greater when wages are high. The other half reflects the fact that high female wages have encouraged women to have smaller families. Smaller families reduce the demands on women's time, freeing women for greater participation in the market.

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The initial version of this report was presented at the Conference on Trends in Women's Work, Education, and Family Building, held in Sussex, England, in June 1983. The purpose of that conference was to advance understanding of the causes of the changes occurring in the economic role of women. To accomplish this aim, separate papers were presented on the changing labor force behavior of women for twelve industrialized countries. We are grateful to the two conference organizers, Professors Richard Layard of the London School of Economics and Jacob Mincer of Columbia University, for the opportunity to present our work and for the many oral and written comments they provided. Professor Claudia Goldin of the University of Pennsylvania was our discussant at the Conference. Her remarks were insightful and illuminating, especially concerning the historical context of the subject. Gary Becker and June O'Neill, who both presented papers at the conference on related topics, also made useful suggestions. We also profited by presentations made at the Department of Labor and the University of Chicago. A part of this report will be published in the *Journal of Labor Economics* supplement of the conference proceedings.

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I. INTRODUCTION

One of the most important social changes in the American economy has been the entry of women into the labor market. Female labor force participation rates increased 50 percent from 1950 to 1970 and continued to grow at an accelerated rate during the 1970s. Moreover, this process had its antecedents well before World War II. During the first forty years of this century, participation rates for married white women increased fivefold.

Other fundamental demographic forces had also long been under way. Fertility rates had declined for generations, but starting in 1921 American women sped the decline, reducing their fertility by more than one-third during the next twelve years. Birthrates reached historic lows during the 1930s depression, rose slightly during World War II, jumped sharply at the War's end and continued to rise until 1957. The trend then reversed and the birthrate fell until the mid-1970s, when it again achieved historic lows. The baby boom and ensuing baby bust weakened economists' confidence in their ability to understand and predict time-series changes in American fertility.

In contrast to these eye-catching developments, calm prevailed on the wage front. Throughout most of the postwar period, female wages remained a constant fraction of those of men.

Seeking reasons for that remarkable growth, we reviewed long-term trends in this century, with an especially detailed look at the years since 1950. Our analysis of long term trends points to a number of important structural changes that took place in the labor market that women faced during this century. The most important change was a sharp increase in women's wages between 1900 and 1920. Part of this increase involved the elimination of a large wage difference between married women and single women that prevailed in the early years of this century. In 1900, marriage was the single most critical deterrent to market work by women. This was understandable in view of the very low wages that married women could earn. We estimate that married women's wages were 30 percent lower than those of single women in 1900. Not surprisingly, most married women chose not to work. By 1960, however, there was very little difference in the wages women in different marital situations could earn.

The principal reason for the sharp increase in women's wages was the emergence of clerical employment. In the first fifteen years of this century, the clerical sector was transformed from a minor part of the female work force to one employing more than one in every three new female workers. The clerical sector opened up a whole new set of jobs to women. These jobs lessened the conflict between work and marriage and permanently raised the wages women would earn.

Other factors also played an important part in the long-term increase in the number of women in the labor force. Coincident with the time period of the most rapid increase in female employment was a significant rise in school completion among women, due in large part to a sharp expansion in high school attendance. It is well established that women's employment increases with their education, especially with the completion of high school and attendance at college. In addition, our research identified three demographic forces that contributed to the long-term growth in the female labor market: the increasing nuclearization of the American family, the urbanization of its population, and the long-term secular decline in fertility.

In our investigation of trends after 1950, we placed special emphasis on the question of how much of the expansion in female labor supply can be explained by rising real wages of men and women. We concluded that real wages have played a significant, but not an exclusive role, both in the long-term increase in female employment and in the more accelerated growth after 1950. For example, over the last three decades, the combined effect of rising male and female wages explains almost 60 percent of total growth in the female labor force. Half of this wage-effect reflects the fact that incentives to work are greater when wages are high. The other half results from the fact that a higher female wage decreases fertility, which in turn increases female labor supply.

This report also addresses the apparent conflict between the stability of relative female wages alongside an enormous increase in female market participation. The alleged conflict exists because many observers have argued that increases in female labor force participation would translate into additional labor market experience, which in turn would enlarge women's market skills--directly, because such skills increase with time on the job, and indirectly, because longer expected labor market durations encourage investments in human capital. And as their market skills increased, so--the argument concluded--would women's wages. But the last link in this chain apparently did not materialize. Female wages have not accelerated relative to those of males as a consequence of their greatly expanded levels of market work. One goal of this report is to offer a resolution to this puzzle.

Because they did not exist, our resolution required that we construct skill distributions for all post-World-War II labor market cohorts. The ones we constructed have two dimensions of skill: years of schooling and years of labor market experience. Our indexes show that convergence--or rather lack of convergence--between the sexes in these skill-related characteristics among people who are working *now* differs greatly from trends in market-related skills of *all* men and women, evaluated regardless of whether they are or are not currently in the work force. Among current workers there is little evidence that either skill or wage disparities between men and women have narrowed over time. However, skill differences by sex in the entire population have converged, especially in the last decade. Correspondingly, our estimate of the relative wage of all women indicates more rapid wage improvement for women than for men. The chain of argument from expanded female labor force participation to additional market experience and higher wages is valid as long as one looks at population averages and not labor force means.

Section II describes the major changes that have occurred during this century in the patterns of women's market work. Section III contains a similar description for women's relative wages. Reasons for the growth in women's work over the long term are the subject matter of Sec. IV. Section V presents our resolution of the apparent conflict between constant relative wages of women alongside the enormous growth in their participation. Section VI concludes with our analysis of the determinants of the increase in women's market work during the years since 1950.

II. WOMEN AT WORK IN THE TWENTIETH CENTURY

The American labor market has been transformed in many ways during this century, but perhaps the most far-reaching is its growing feminization. The traditional division of labor within the family, with the husband as wage-earner and the wife as homemaker, has been eroding steadily[1] as women have joined the labor force (See Table 1). At the beginning of this century, less than one woman in five was a member of the labor force; by 1983 more than six in ten women aged 20 and above were in the labor force. Although both white and nonwhite women have increased their levels of market work, the pace of change was decidedly more rapid among white women.

The growth in the female labor force was so pervasive that its presence is detectable no matter how one slices the data. However, secular trends were not uniform over time, place, or demographic group, and such differences may contain important messages about underlying causes. Table 2 represents our first depiction of these patterns by examining secular trends by age. Before 1940, one has the sense of witnessing a slowly accelerating force. Increases in female participation were slightly larger among younger women and in the years close to 1940--the standard trademarks of a growing across-cohort evolution. This historical regularity ended in 1940. For the next 20 years the age shape tilted towards older women. Between 1940 and 1960, participation rates actually declined for women under 35--the mothers of the baby-boom generations. In contrast, market work for women over age 35 jumped so sharply that it dwarfed the entire previous historical experience for mature women.

---

[1] The 1940 Census fundamentally revised the concept of the labor force. Previously, the labor force had been defined as consisting of people who were usually *gainfully employed* in an occupation. Beginning in 1940, labor force participation was defined as including those with a job or looking for a job in the Census Survey week. Thus, the pre-1940 Census data are not strictly comparable to the post-1940 data. These two time-series participation rates have been adjusted by Durand (1948) and Bancroft (1958) to make them as comparable as possible.

Table 1

FEMALE LABOR FORCE PARTICIPATION RATES, 1890-1983

Ages	1890	1900	1920	1930	1940	1950	1960	1970	1983
14-19	24.5	26.6	28.4	22.8	18.9	22.6	23.9	25.5	50.8[a]
20-24	30.2	31.7	37.5	41.8	45.6	42.9	44.9	56.3	69.9
25-34	16.8	19.3	23.7	27.1	33.3	31.8	35.2	45.2	69.0
35-44	12.7	15.7	19.2	21.7	27.2	35.0	42.6	50.6	68.7
45-54	12.5	15.0	17.9	19.7	22.5	32.9	46.7	52.9	61.9
55-64	11.4	13.2	14.3	15.3	16.8	23.5	35.0	42.4	41.5
All ages	18.2	21.0	22.7	23.6	25.8	29.0	34.5	39.9	52.9[b]
Ages 20-64	17.4	19.7	22.9	25.4	29.4	33.0	40.6	49.2	63.2
All white (20-64)	14.9	16.9	19.2	23.3	27.9	31.9	39.6	48.3	63.0
All nonwhite (20-64)	39.3	42.2	43.1	44.1	43.3	43.1	50.0	56.2	64.0

SOURCES: 1890, 1920, 1930: Bancroft. 1900: micro file of 1900 Census. 1940-1970: published tables of decennial Census (various issues). 1983: *Employment and Earnings*, January 1984.

[a] Ages 16-19.

[b] Ages 16 and over.

Table 2

SECULAR CHANGES IN LABOR FORCE PARTICIPATION

Change Between	Ages 20-24	25-34	35-44	45-54	55-64
1890-1920	7.3	6.9	6.5	5.4	2.9
1920-1940	8.1	9.6	8.0	4.6	2.5
1940-1960	-0.7	1.9	15.4	24.2	18.2
1960-1983	24.3	33.8	26.2	15.2	6.3
1970-1983	13.6	23.8	18.1	9.0	-0.9

After 1960, the age patterns of the early years of this century were repeated, but at a greatly magnified scale. With the onset of the baby bust, the work activity of young women expanded enormously. Although middle-aged women continued to reenter and remain in the labor force in record numbers, labor force rates of women over age 55 actually fell during the 1970s. Even considering this extensive historical record, we must be impressed by the expanded labor market involvement of younger women during the last decade. For American women 25-34 years old, participation rates have been rising by more than 2 percentage points per year.

By rearranging these cross-sectional profiles, Tables 3 and 4 provide a look at history from a birth-cohort perspective. As a visual complement to these tables, Fig. 1 plots life-cycle employment profiles for selected birth cohorts.[2] Perhaps the most important conclusion to be derived from these cohort-specific profiles is that the root causes of the growth in the female work force had their origins very early in this century, and even back into the 19th century. Each new generation of women depicted in Table 3 had profiles that were above their predecessors. The remarkable transformation of American women at work cannot simply be viewed as a result of changes in attitudes or in labor markets that have taken place exclusively since World War II.[3]

However, these changes across cohorts were far from uniform, and the shape of the life-cycle participation profile within cohorts has substantially altered during this century. Figure 1 shows the evolution in the shape of life-cycle employment profile. For the two earliest birth cohorts illustrated, employment rates of women declined quickly during their twenties, reflecting the onset of marriage and childbearing. After age 30, however, participation rates were fairly flat until women neared retirement age. The second diagram in this series illustrates the emergence of labor market reentry after childbearing, a phenomenon that clearly owes some of its parentage to

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[2] Note that Tables 3 and 4 refer to *participation* rates while Fig. 1 refers to *employment* rates.

[3] This observation is aptly made by Goldin (1983) and is the theme of much of her work.

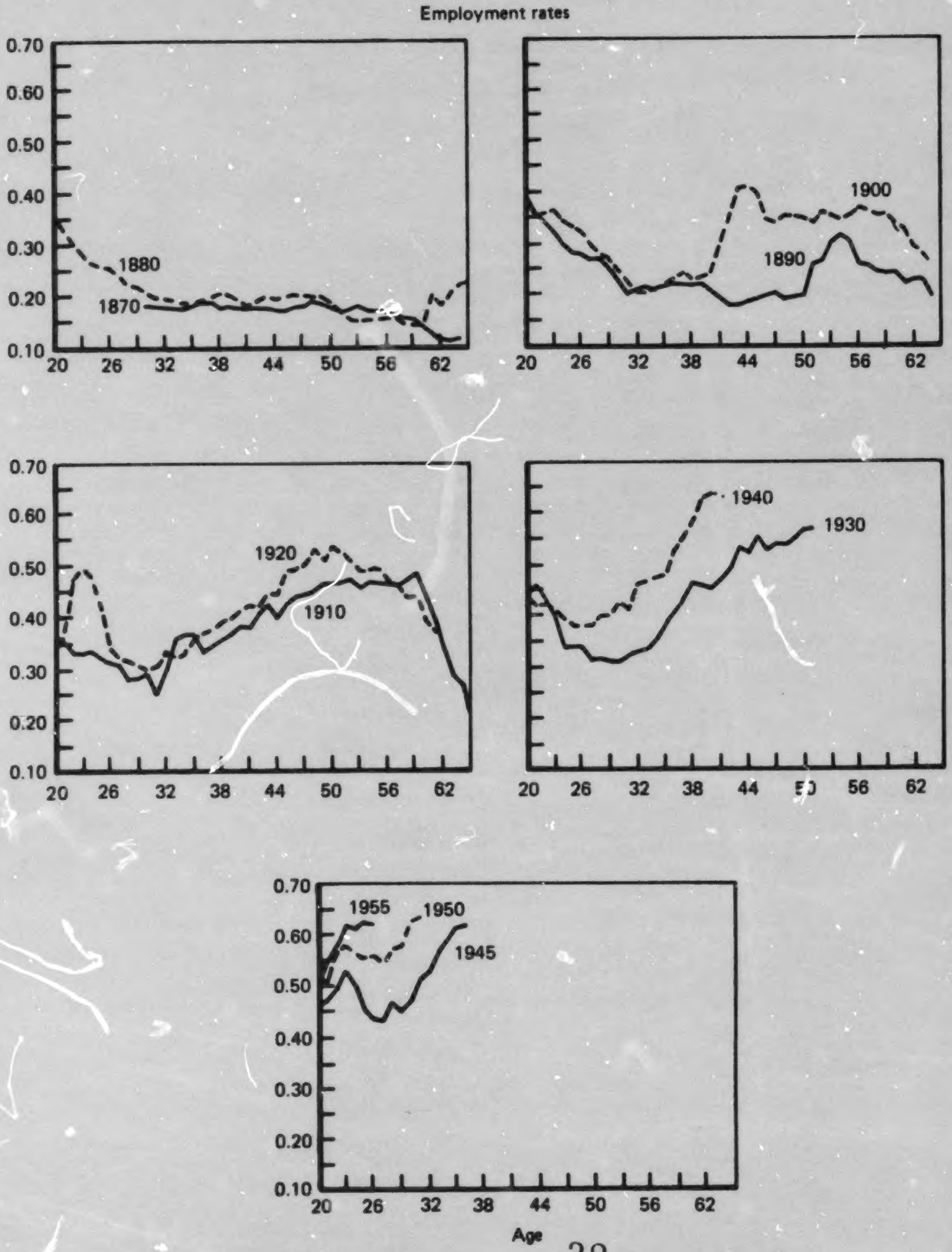

Fig. 1 — Employment ratios by birth cohorts

Table 3

FEMALE LABOR FORCE PARTICIPATION RATES BY BIRTH COHORT

		Ages									
	Birth Cohort	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
	1826-30										11.4
	1831-35									11.4	
	1836-40								12.5		12.5
	1841-45							12.5		13.9	
	1846-50						12.7		16.1		
	1851-55					12.7		14.1			
	1856-60				16.8		14.3				13.0
	1861-65			16.8		16.8				15.4	
	1866-70		30.2		17.0				17.5		13.9
	1871-75	24.5		21.3				18.3		16.5	
	1876-80		31.7				18.8		17.0		14.8
	1881-85	26.6				19.6		20.3		18.5	
	1886-90				19.8		21.1		21.2	*	20.6
	1891-95			27.0		22.3		23.7	*	25.9	
	1896-1900		37.5		23.6		26.0	*	30.8		29.4
	1901-05	28.4		30.2		28.3	*	34.8		39.7	
	1906-10		41.8		30.9	*	36.4		45.9		36.4
	1911-15	22.8		35.5	*	33.8		47.4		47.6	
	1916-20		45.6	*	31.0		45.3		52.4		41.4
baby boom	1921-25	18.9	*	32.6		40.2		53.3		41.4	
	1926-30		42.9		35.5		52.4		61.1		
	1931-35	22.6		35.0		48.7		61.1			
	1936-40		44.9		44.6		66.8				
	1941-45	23.9		45.7		66.8					
	1946-50		56.3		66.7						
	1951-55	22.5		66.7							
	1956-60		69.6								
	1961-65										

World War II. The middle diagram depicts the life-cycle shape with which we are most familiar. Labor force reentry now occurs without the assistance of wars and at an earlier point in the life-cycle. The last two diagrams illustrate the most recent denouement in this process. Recent growth in female employment has been so large that the 1955 birth cohort exhibits no employment decline during its childbearing years.

Our description of the twentieth century patterns in female employment is reinforced after we condition on marital status, as in Tables 4 and 5. Table 4 presents labor-force participation rates by age for married women, while Table 5 rearranges these cross-sectional profiles to provide a clearer picture of within-cohort trends. Particularly for white married women, market work is a product of the twentieth century. In 1900, fewer than 1 in 50 white married women were in the labor force. However, the rise in market participation by married women occurred throughout this century, and not simply after World War II. Among all married women 25-34 years old, participation rates doubled between 1920 and 1940, increasing from 9.7 to 20 percent. In the early part of this century, the married female labor force grew fastest among the young. After World War II, married women who had completed their childbearing were the most prominent group. However, in contrast to the declining work propensities of all young women between 1940 and 1960, participation rates of young married women actually rose more than 10 percentage points. Their increasing propensity to work was simply offset by rising marriage rates, with women leaving high-participation states (single) to enter lower ones (married).

Outside of responsibility for young children, perhaps the best established empirical correlate of female participation is schooling. Female employment rises with education, particularly as it extends beyond high school. Education levels have risen rapidly over time, so it is natural to look toward schooling as an important element of any time-series explanation. As shown in Table 6, participation rates increase sharply by schooling level in 1940, 1970, and 1983 in all cross-sections and across all age groups.[a]

---

[a] The participation rates for 1940 and 1970 were derived from the U.S. Decennial Census, and for 1983 from the *Current Population Survey*.

Table 4

LABOR FORCE PARTICIPATION RATES: MARRIED, SPOUSE-PRESENT WOMEN

	Year, 1890-1940[a]					Year, 1940-1982				
Ages	1890	1900	1920	1930	1940	1940	1950	1960	1970	1982
14-19	6.4	7.3	12.5[b]	12.9[b]	18.0	8.1	19.4	25.3	36.0	49.6
20-24		7.3	11.4	16.3		17.3	26.0	30.0	47.4	62.1
25-34	4.7	6.1	9.7	14.0	20.0	17.9	22.2	27.7	39.3	61.8
35-44	4.4	6.4	9.5	12.1	17.1	15.3	26.5	36.2	47.2	64.1
45-54	3.8	5.1	6.6[c]	7.8[c]	12.4	11.1	23.0	40.5	49.5	57.6
55-64	2.9	2.6			7.7	7.1	13.1	24.3	35.8	36.6
All ages	4.5	5.2	9.0	11.7	15.4	13.8	21.6	30.5	40.8	51.2
All ages (whites)	2.4	2.8	6.5	9.6	13.6	12.5	20.7	29.8	39.7	48.5
All ages (nonwhites)	21.9	25.1	31.8	30.3	32.2	27.3	31.8	40.5	52.5	59.7

SOURCES: *For 1890-1940*: 1890, 1940: Durand, Table A-7; 1900: micro data file of 1900 U.S. Census; 1920, 1930: decennial published U.S. Census Reports. *For 1940-1981*: U.S. Census, 1940-1970, Table 5, "Employment Status and Work Experience"; 1950-1982: *Employment and Training Report of the President*, 1982, Table B-3.

[a] Includes married, spouse-absent women.

[b] Ages 15-19.

[c] Ages 45+.

The rate of secular change in participation within education levels produced important compositional changes in the female work force between 1940 and 1970. The largest increases in market work between 1940 and 1970 took place among less educated women. By 1970, female participation still increased with schooling, but the slope of the cross-sectional relation was much less steep. During the 1970s, the secular trend reversed, and more educated women now exhibited the largest employment increases. These shifts in the education level of the female work force have important implications for our interpretation of time-series trends in women's wages as well as our understanding of the time-series trends in participation.

Table 5

LABOR FORCE PARTICIPATION RATES

Birth Cohort	Ages 14-24	25-34	35-44	45-54	55-64
Sample: All Married Women					
1826-35					2.9
1836-45				3.8	2.6
1846-55			4.4	5.1	
1856-65		4.7	6.4		6.6
1866-75	6.4	6.1		6.6	7.8
1876-85	7.3		9.5	7.8	7.7
1886-95		9.7	12.1	12.4	* 13.1
1896-1905	12.0	14.0	17.1	* 23.5	24.3
1906-15	14.0	20.0	* 26.5	40.5	35.8
1916-25	18.0	* 22.2	36.2	49.5	36.5
1926-35	21.0	27.7	47.2	58.0	
1936-45	27.0	39.3	62.5		
1946-55	42.0	61.6			
1956-65	55.0				
Sample = White Married Women					
1826-35					1.7
1836-45				2.3	1.8
1846-55			2.5	2.7	
1856-65		2.6	3.2		5.0
1866-75	2.9	3.0		5.9	6.3
1876-85	2.5		7.9	6.3	7.1
1886-95		7.1	9.8	11.1	* 12.6
1896-1905	8.3	11.5	14.5	* 22.2	24.6
1906-15	13.2	18.0	* 25.3	38.6	35.3
1916-26	16.2	* 21.0	35.4	49.0	36.8
1926-35	22.0	26.7	45.9	53.9	
1936-45	28.0	37.6	59.1		
1946-55	43.5	56.0			
1956-65	58.3				

SOURCES: See Table 4.

Table 6

LABOR FORCE PARTICIPATION BY EDUCATIONAL LEVEL

	Years of Schooling					
Year	0-7	8	9-11	12	13-15	16+
			Ages 20-24			
1940	32.0	36.4	39.3	56.7	47.6	65.4
1970	35.1	35.2	39.7	59.6	56.4	79.3
1983	26.4	45.2	45.2	73.6	69.7	86.1
			Ages 25-34			
1940	28.6	27.7	29.6	38.0	40.9	57.7
1970	35.8	37.1	39.2	47.4	46.7	58.9
1983	33.7	46.6	49.1	66.3	74.1	82.6
			Ages 35-44			
1940	28.9	22.8	25.8	31.0	33.2	48.6
1970	40.1	45.0	50.3	51.6	50.7	59.4
1983	39.9	49.7	59.5	70.6	72.2	76.5
			Ages 45-54			
1940	24.2	19.7	22.9	26.6	31.5	46.9
1970	41.1	46.0	51.1	55.9	56.6	67.2
1983	35.9	47.5	53.5	64.0	69.1	74.6
			Ages 55-64			
1940	19.2	15.1	18.5	20.4	26.3	38.6
1970	31.7	36.8	41.9	47.2	48.1	61.8
1983	28.5	31.6	35.1	44.4	45.4	55.1

SOURCES: 1940-1970 Decennial U.S. Census. 1983 Special Labor Force Report: *Educational Attainment of Workers*, March 1983.

Closely intertwined with decisions regarding women's work are those involving marriage and family formation. Figure 2 plots total fertility rates for all years between 1919 and 1978. The rates had been falling for generations, but starting in 1921 American women quickened the process, reducing their fertility by more than a third during the next

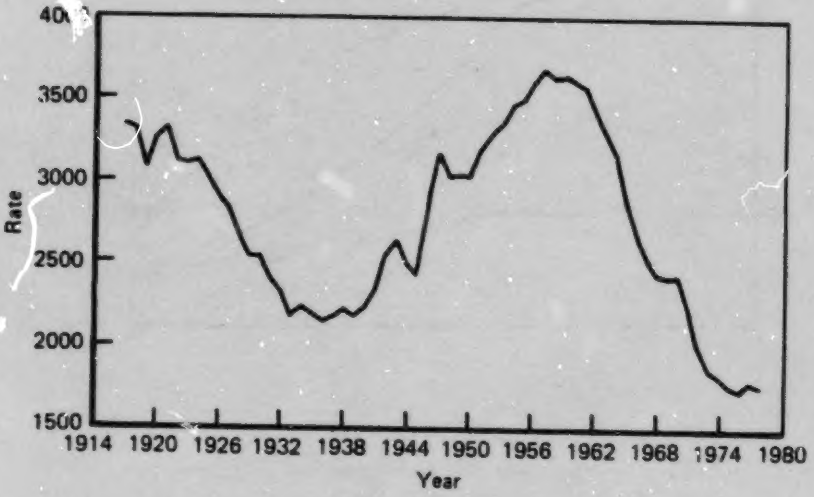

Fig. 2 — Total fertility rates

12 years. Birth rates reached historic lows during the Depression. Beginning in 1947, fertility rates jumped sharply and continued to rise until 1957. Then the trend reversed, and the number of births fell until the mid-1970s, when they again hit record lows.

An alternative perspective is provided in Fig. 3, in which age-specific birthrates are plotted for the critical 20-30 age range of mothers. These birthrates and eventually cumulative fertility declined between 1890 and 1910. Not only did women born in 1910, who spent most of their childbearing years during the Depression, have low fertility, but also, over this range, there was no age concentration in their spacing. After the birth cohort of 1910, and continuing to those born in 1935, age-specific birthrates increased. Not only were fertility rates rising for these cohorts who produced the baby-boom generation, but also the shape of their age-specific profiles was becoming markedly more peaked, indicating a greater concentration of births at younger ages. We can detect the first inkling of the baby bust in the 1940 birth cohort in Fig. 3. For women born after 1910, birthrates declined particularly rapidly during ages 20-25. We know that our fertility roller-coaster ride was over because the 1950 and 1910 cohorts are almost identical.

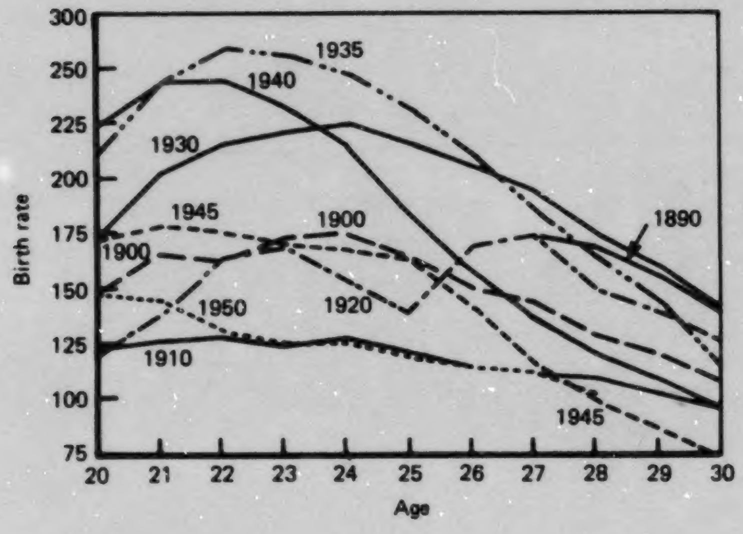

Fig. 3 — Age—specific birth rates, for all women
Cohorts of 1890—1950

These dramatic swings in postwar fertility were paralleled by similar trends in household formation and marriage. Table 7 lists, at 10-year intervals, the fraction of women in three marital states: never married; currently married; and other. Over the 50-year period between 1890 and 1940, women gradually married at somewhat younger ages. But the dominant trend in Table 7 took place after 1940, with a cycle in marriage rates of dramatic magnitude and swiftness. During the baby-boom years, the fraction of women who were never married declined sharply, particularly for women under 30. In 1940, almost half of all women between the ages of 20 and 24 were never married; 20 years later the comparable figure was less than one-third. By 1980, however, marriage rates had almost returned to their 1890 levels. The principal exception was the emergence during the last decade of the "other" marital status category as a significant fraction of the population. By 1980, almost one in ten women between 30 and 44 were once married, but now lived apart from their former husbands.

Table 7

MARITAL STATUS BY AGE, 1940-1980

Year	Never Married	Currently Married	Other	Never Married	Currently Married	Other
	Ages 20-24			Ages 25-29		
1890	51.8	46.7	1.4	25.4	71.4	3.2
1910	48.3	49.7	1.7	24.9	71.8	2.8
1930	46.0	51.6	2.1	21.7	74.3	3.8
1940	47.2	51.3	1.5	22.8	74.1	3.1
1950	32.3	65.6	2.1	13.3	83.3	3.4
1960	28.4	69.5	2.1	10.5	86.2	3.3
1970	36.3	60.5	3.2	12.2	82.5	5.4
1980	50.2	45.9	3.8	20.8	70.3	8.9

III. WOMEN'S WAGES IN THE TWENTIETH CENTURY

In this section we describe what happened to male and female wages during the twentieth century.[1] We first trace long-term trends in female-male income ratios that span the entire century. We then examine, in more depth, secular trends in women's wages that have occurred since 1950.

LONG-TERM TRENDS IN WOMEN'S WAGES

Historical data on income are sparse, especially when one aims for stratification by several demographic variables and reasonably representative national samples. For example, the 1940 Census was the first decennial Census to include income questions. Therefore, we were forced to opt for indirect methods to develop a long-term income series. Fortunately, the Census has published occupational distributions of the work force separately by race, sex, and age beginning in 1890. Using these data, we can track all birth cohorts since the Civil War from the start to the end of their labor market lives. Even earlier birth cohorts provided partial slices of their labor force histories.

The major difficulty in using these occupation data was the construction of a set of consistent occupation categories that we could use over this long time span.[2] Each successive Census varied the number of occupational categories, and the meaning of some occupations, even if the title remained the same, often changed. The series we have assembled places men and women into one of 60 occupational categories for the entire period 1890 to 1979.[3] Based on this occupational taxonomy, we assigned an average income specific to each occupation, sex, age, and race, derived from the 1960 decennial Census. Using these weights, we calculated male-female income ratios for each birth cohort at different points in their life-cycles. By construction, our long-term income index will be sensitive only to changes in the distribution of men and women across occupational categories. The index ignores time-series fluctuations that reflect only changes in the occupational income structure or income differences by sex within occupation.[4]

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[1] To anticipate developments later in this report, all the wage or income statistics presented in this section refer to comparisons of *working* women with *working* men.

[2] The procedures used and the difficulties involved in constructing this series are described Smith's paper, *Race and Human Capital*.

[3] The 1890-1950 data are constructed from published Census tables. The 1960 and 1970 distributions were calculated from the 1-100 Census tapes. The 1980 CPS was used for the 1979 data.

Table 8 presents our estimates of female-male income ratios by five-year birth cohorts from 1826 to 1956. Our estimates of the aggregate female-male income ratio in each Census year are listed in the last two rows of this table. This aggregate series implies that relative female income rose rather sharply from 1890 to 1920. During these 30 years, the relative income of all working women increased by 16 percent. The age-specific ratios show that most of this improvement was concentrated on younger women. As a consequence, between 1890 and 1920, the cross-sectional relative wage profile became much more negatively inclined. From a cohort perspective, this relative wage gain for women probably dates after birth-cohort-year 1876 and continues at an accelerating pace until the first five or ten years of this century. After calendar year 1920, relative female incomes drifted slowly downward until 1960. There is some evidence of a recent reversal in this downward trend, but any recent wage advancement for women has been modest.

This essentially constant male-female income ratio over the last 50 years has become a central stylized fact concerning wage disparities by sex. Despite the enormous influx of women into the labor market and the accumulation of market experience it implies, the constant wage gap between the sexes is viewed by many as an anomaly.

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[4] Although we have experimented with various income weights, Table 8 is based on occupation-specific incomes stratified by sex and race for those 35-49 years old in the 1960 Census. The use of other weights, in terms of either a different base year (1970 or 1979) or age-specific data, did not alter the patterns. It did, of course, affect the levels. Because they vary with the year used, the income levels in Table 8 should not be assigned much importance. In addition, these are income and not hourly wage ratios. Therefore, their level is lower than the 60-percent ratio, which is widely assumed to measure the wages of women relative to men.

Table 8

ESTIMATED FEMALE-MALE INCOME RATIOS
BY BIRTH COHORTS (WHITES)

	Census Year									
Birth Cohort	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
1956-60										.514
1951-55										.483
1946-50									.517	.448
1941-45									.474	.434
1936-40								.524	.442	.434
1931-35								.472	.429	.432
1926-30							.547	.443	.432	.427
1921-25							.484	.427	.429	.424
1916-20						.522	.451	.429	.429	.422
1911-15						.490	.442	.438	.430	
1906-10					.559	.474		.433	.432	
1901-05					.503	.454	.433	.427		
1896-1900				.575	.464	.439		.415		
1891-95				.458	.439	.424	.420			
1886-90					.421	.416	.410			
1881-85		.500			.406	.406				
1876-80					.392	.395				
1871-75	.462	.428		.376	.380					
1866-70					.368					
1856-65	.410	.375								
1846-55	.370	.346								
1836-45	.344	.336								
1826-35	.335									
All ages 10-75	.395	.412	.423	.470	.463	.455	.457	.442	.447	.450
Ages 20-64	.398	.413		.462	.463	.458	.458	.443	.447	.452

In addition to changes in aggregate ratios over time, our income index provides insights into cohort and life-cycle issues. If we follow any birth cohort over its labor market career (reading across a row) female-male income ratios decline sharply. This well-known career pattern characterizes every birth cohort contained in Table 8. More important, the rate of relative wage decline for women over their careers appears not to have altered much over this period.

Reading up any diagonal in Table 8 allows us to isolate cohort changes in relative wages evaluated at any age group. We have already mentioned the significant rise in the relative wages of women born between 1875 and the first few years of this century. Outside of this period, we are most impressed by the absence of any large cohort-styled swings in relative incomes of women. After birth cohort 1910, a reasonable characterization is that relative incomes of women were independent of their birth cohort. As a further illustration of the absence of cohort effects, the decline in relative wages of women that we would predict from any cross-section is quite close to the actual decline observed over careers.

The principal concern with this index is its reliance on a constant income metric. If the structure of occupational wages varies over time, the use of a fixed weight index may obscure the actual trend. Obviously, across the length of the historical period with which we are dealing, relative wages across occupations were not time-invariant. It is reassuring that the actual pattern of female-male wage ratios that we observe since 1950, when income-by-sex data become available, conforms remarkably well to the patterns described in Table 8.

As an additional test, we have constructed a second index that relies on a less demanding assumption. The requirement with this index is that the ranking of occupations, as measured by their average income, remained stable over time. More precisely, this second index, a variant of the Mann-Whitney statistic, measures the probability that a randomly selected working woman is in an occupation with a higher average income than a randomly selected working man.[8] Equal economic status by sex occurs at probabilities of 0.5, while improvement for women is synonymous with rising probabilities.

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[8] Let m_i and t_i be the proportions of men and women in occupation i, and F_i the proportion of women in all occupations with a higher income rank than occupation i. Our statistic is defined as $\Sigma m_i F_i + \Sigma m_i f_i$.

Table 9 presents our alternative ordinal index. The patterns of wages it describes are remarkably close to those obtained with the fixed weight income index. The time series are identical: sharply rising relative incomes of women until 1920-1930, a slow deterioration until 1960, then reappearance of a small upward trend. In addition, both indexes depict similar changes across birth cohorts.[6]

THE POSTWAR PERIOD

Describing wage trends by sex is considerably easier in the postwar period, when income data stratified by sex and other demographic variables become routinely available. To describe the postwar trend, Table 10 lists ratios of weekly wages starting in 1950.[7] Our long-term summary is confirmed by these weekly wage ratios across the postwar period. Across all ages, Table 10 depicts a slow downward drift in female wages as a percent of male wages until the mid-1970s. After 1975, weekly wages of women rose more rapidly than those of men. Relative wages of women less than age 35 declined until 1970.[8] But during the last decade some of these wage losses were recouped. For women 35 and older, rough stability prevails in their relative wages.

One disadvantage in using weekly wages is that it does not contrast monetary compensation between men and women for the same amount of work. Women work fewer hours than men during a typical workweek, and for that reason alone their weekly wages will be lower than men's. A preferable

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[6] The only real discrepancy between the two series concerns the life-cycle shape. The Mann-Whitney statistic indicates rising relative female incomes at the later stages of life cycles.

[7] Weekly wage ratios are presented because we analyze weekly wages in our analytical sections below.

[8] Over the 1950-1980 time period, the general trends depicted in Table 10 using actual wage data are consistent with those in Table 7 that rely on our occupation imputation method. Among younger age groups, both show a U-shaped trend, with the largest female-male income ratios occurring in 1950 and 1980. For older age groups there is general stability between 1950 and 1980. Not surprisingly, the magnitudes of the swings are much larger in Table 10, suggesting that occupation-based wage shifts are reinforced by other factors.

Table 9

MANN-WHITNEY PROBABILITIES

	Census Year									
Birth Cohort	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
1956-60										.351
1951-55										.313
1946-50									.288	.280
1941-45									.250	.268
1936-40								.283	.226	.266
1931-35								.241	.222	.266
1926-30							.341	.229	.231	.266
1921-25							.268	.230	.237	.262
1916-20						.371	.279	.248	.254	.290
1911-15						.329	.289	.265	.269	
1906-10					.381	.307		.274	.284	
1901-05					.326	.300	.301	.280		
1896-1900				.414	.304	.299		.284		
1891-95				.317	.298	.296	.300			
1886-90					.294	.299	.298			
1881-85		.398			.288	.295				
1876-80					.277	.293				
1871-75	.333	.290		.244	.263					
1866-70					.245					
1856-65	.249	.221								
1846-55	.211	.208								
1836-45	.211	.228								
1826-35	.231									
All ages 10-75	.251	.292	.304	.335	.318	.316	.309	.267	.263	.302
Ages 20-64	.227	.249		.298	.301	.307	.295	.256	.245	.280

Table 10

FEMALE WEEKLY WAGES AS A PERCENT OF MALE WAGES, 1950-1980

	Age Group						
Year	All Ages	20-24	25-29	30-34	35-44	45-54	55-64
1950	55.9	77.8	68.6	58.8	48.5	48.7	49.0
1955	54.9	77.1	62.7	54.2	49.6	50.2	49.1
1960	51.2	80.0	61.1	50.8	45.0	46.1	44.1
1965	51.3	84.3	62.9	52.9	49.9	48.7	49.7
1970	50.2	71.9	54.8	46.6	44.4	48.2	52.0
1975	50.3	71.6	61.3	48.2	44.1	45.7	48.2
1980	52.7	70.6	64.3	54.6	47.5	46.0	49.6

SOURCE: Derived from CPS tapes 1968-1982, and published Census sources for earlier period.

method of comparing the economic rewards by sex is to use wage rates received per hour of work. Table 11 presents these ratios of women's hourly wages to those of men at selected years since 1956.

During the 1960s and 1970s, those ratios averaged about 59 percent. (The persistence of the 59 percent figure gave rise to the popular button worn by feminists.) The trend in Table 11 is generally consistent with the general trends we have just described with our weekly wage series. After 1956, women's hourly wages drifted slowly downward until the 1970s. During the decade of the 1970s, there was some improvement in the economic status of women.

However, the real story of Table 11 is the spectacular and historically unique improvement in women's relative hourly wages that has taken place between 1980 and 1983.

The relative wage of women rose to 64 percent in 1983 from the 60 percent level that prevailed in 1980. No other time period approaches this one in the extent and rapidity of the improvement. In 1983, women who were employed full-time, year-round, earned $14,479 while similarly employed men earned $22,508. After controlling for inflation, such women in 1980 earned $14,013 while men earned $23,178. In terms of real purchasing power, the hourly wages of women rose 3.3 percent over this

Table 11

HOURLY WAGES OF WOMEN AS A PERCENTAGE OF THOSE OF WHITE MEN

Year	All Women	White Women	Black Women
1956	63.3	62.9	35.3
1960	60.7	60.6	41.1
1964	59.1	59.4	41.2
1968	58.5	58.2	43.4
1972	57.4	56.5	48.9
1976	60.0	58.7	55.2
1980	60.5	59.3	55.6
1983	64.3	62.3	56.6

SOURCE: *Current Population Reports* Consumer Income Series P-60, Various Issues. The ratios reported here are median earnings of year-round full-time workers. The All column represents the wages of all women to all men. The reference group in the second and third columns is white men.

period while the real wages of men declined 3 percent. These statistics suggest that a significant improvement has been taking place in women's labor market since 1980, and has largely gone unrecognized. Some reasons for this change are examined in Sec. V.

Table 11 also reveals some distinct racial trends--in particular, the impressive wage gains of black women. Since 1956, their hourly wages have increased 47 percent more rapidly than those of white men. In 1956, the average black working woman earned about one-third of the hourly wages of white men. By 1983, that figure had increased to 57 percent. But the contrast between black women and white women is perhaps most extraordinary. In 1956, the average black woman earned about half the wage of a similarly employed white woman. In recent years, the disparity has almost vanished.

Secular trends in women's wages differ in other ways besides race. To illustrate one such dimension, Table 12 presents ratios of women's hourly wage rates to those of men, separately by age groups. The bulk of the recent improvement in women's economic position took place among young women. Table 12 demonstrates that while their relative hourly wages have risen slightly in recent years, the relative wages of women over 45 years old were slightly lower in 1983 than in 1964. However, hourly wages of younger women did increase rapidly during the 1970s and especially so since 1980. The hourly wage ratios of women under age 45 have achieved historic highs. During the last three years, while the income of young men (adjusted for inflation) has been falling, the income of young women in constant dollars has been increasing. For example, in 1983, women aged 25-34 earned $15,082 and men $20,584. This represented a real increase for women of 2 percent since 1980, compared with a real income decline of 4 percent for men. Similarly, women 35-44 earned $15,839 in 1983 while men received $25,852. This translates into a 5 percent real increase for such women and a 2 percent decline for

Table 12

HOURLY WAGES OF WOMEN AS A PERCENTAGE OF THOSE OF MEN IN THE SAME AGE GROUP

	Age Group				
Year	20-24	25-34	35-44	45-54	55-64
1964	82.0	62.0	55.2	57.4	60.7
1968	74.5	62.9	53.2	55.8	61.2
1972	76.4	64.9	52.3	52.3	56.5
1976	77.8	67.5	55.7	53.8	57.4
1980	77.7	68.8	56.2	54.3	56.7
1983	86.3	73.2	61.3	56.2	59.1

SOURCE: *Current Population Reports*, Consumer Income Series P-60, Various Issues. The ratios are based on median earnings of year-round full-time workers.

men. The economic position of women under 30 has improved so rapidly during the last few years that, for the first time, wages of young women have risen as rapidly as those of young men as their careers progressed. For example, in 1978, women 25-34 years old earned 71 percent as much as men of the same age. Five years later, women who were 30-34 years old earned 72 percent as much as men 30-34 years old.

The next dimension in which we illustrate recent trends involves education. Table 13 lists ratios of hourly wages by sex within education categories in 1982 and 1976. Over this period, women have improved their position relative to men at all education levels. Among those 25-34 years old, the gains women achieved appear to be relatively equally distributed across all education categories. But among those 35-44, the largest improvements for women are clearly concentrated among college graduates. This suggests that the wages of college-educated women may not decline relative to those of men as sharply as typical patterns have been in the past.

Table 13

HOURLY WAGES OF WOMEN AS A FRACTION OF THOSE OF MEN BY EDUCATION

	Ages 25-34		Ages 35-44	
Educational Level	1982	1976	1982	1976
College postgraduate	78.2	74.4	65.1	61.5
College degree	73.5	69.9	63.3	54.4
High school graduate	69.1	64.7	58.1	56.7

SOURCE: See Table 12.

CONCLUSION

In this section, we described trends in women's wages relative to those of men. Our description took three forms: long-term trends spanning the entire twentieth century, immediate trends across the years 1950 and 1980, and quite recent developments since 1980.

Our long-term series implies that, relative to men, working women's income increased rather sharply--16 percent--from 1890-1920. After 1920, relative female incomes drifted slowly downward until 1960, with some modest improvement thereafter from 1960 to 1980. Our long-term income series indicates only slightly lower relative female incomes in 1980 than in 1920. Section IV explores the reasons for the growth in the female labor force, and Sec. V addresses the puzzle of the essentially constant male-female income ratios over the last 50 years in spite of that large growth.

Describing our intermediate-term trend from 1950-1980 is considerably easier, because income data stratified by sex and other demographic variables become routinely available. These trends are generally consistent with those described by our long-term series. Across all ages, there was a slow downward drift in the ratio of female-to-male wages until the mid-1970s. After 1975, weekly wages of women rose more rapidly than those of men; the gains were concentrated among women aged 35 and younger. When we stratify our data by race, we find that black women made significant wage gains relative to white men during the years 1950-1980. In 1950, the typical working black woman earned one-third the wage of a white man; by 1980, this ratio had risen to 57 percent. Meanwhile, the disparity between black and white women almost vanished.

We concluded this section with a brief description of some very dramatic changes in women's wages that have taken place since 1980. In 1980, women's hourly wages were 60 percent of those of men; by 1983, the figure had risen to 64 percent--the largest and swiftest gain that we measured using any of our series during this century. These recent wage gains were particularly large among younger women. In 1980, women 20-24 years old earned 78 percent as much as men of that age. By 1983, this ratio had risen to 86 percent. Similarly, women 25-34 years old received 69 percent of the wage of men in that age group. By 1983, this ratio had reached its historic high at 73 percent. There is also some evidence that the wage gains have been somewhat larger among college graduates than among women with less schooling.

We finish this section with an important caveat. All the wage series that we described in these sections are comparisons of *working* women relative to *working* men. Such comparisons are in fact the conventional method of comparing wages of women relative to men and they underlie all government reported statistical series. However, we will demonstrate in Sec. V that such limited comparisons seriously distort the actual trends in the economic status of all women relative to all men.

IV. WHY DID THE AMERICAN FEMALE LABOR FORCE GROW?

Our research project on the determinants of the growth in the female labor force has proceeded on two complementary fronts. In this section, we summarize work documenting historical trends that span the entire century. In Sec. VI, we report results using a more formal statistical model applied to the years 1950-1981, when the availability and quality of time-series data improve significantly.

A study of the long-term determinants of the expansion in the number of women in the labor force is desirable for many reasons. We know that women's market participation has grown throughout the twentieth century. Explanations for this increase that are unique to certain time periods, such as the last two decades, should be given less weight if they do not at the same time explain similar behavior in other decades. Indeed, the increasing number of married women in the labor market during the first few decades of this century is a far more significant departure from the past than the recent increases in the women's work force that have received far more attention. Our aim in this report is to seek an explanation for the increasing number of women at work that pertains to both prewar and postwar developments.

WOMEN'S LABOR MARKET IN 1900

Because the growth in married women's work is largely a twentieth century development, 1900 is a natural place to begin. By identifying the determinants of women's wages and labor supply in 1900, our hope was to understand how the structure of the female labor market must have changed to enable the expansion in the labor force that would eventually occur.

Table 14 lists our "pseudo wage" regression based on the micro file of the 1900 census.[1] The "pseudo" label is used because earnings were not directly available from the 1900 file. Rather, an earnings amount

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[1] The 1900 Census is a nationally representative sample of the population of the United States in 1900. The sample consists of 100,438 individuals, representing a sampling rate of 1/760 of the population.

Table 14

FEMALE ℓn EARNINGS EQUATIONS

("t" statistics in parentheses)

Variables	1900 Census	1960 Census
Married, spouse present	-.302	-.016
	(10.6)	(2.00)
Married, spouse absent	-.093	-.019
	(2.32)	(.95)
Widowed or divorced	-.065	-.035
	(2.49)	(3.45)
Age 14-24	.1104	.1589
	(36.4)	(77.2)
Age 25-44	.0048	.0018
	(3.02)	(3.37)
Age 45+	.0011	.0067
	(.43)	(9.11)
Illiteracy	.1872	
	(7.60)	
Education		.066
		(67.7)
Race	-.8258	-.4764
	(32.8)	(53.1)
South Atlantic	-.087	-.066
	(3.34)	(7.32)
North Central	-.040	-.076
	(2.09)	(10.3)
South Central	-.273	-.094
	(10.1)	(10.4)
West	-.110	-.1015
	(.28)	(11.4)
Intercept	6.404	5.566
	(266.1)	(302.5)
R^2	.50	.52
Sample size	6302	20210

was assigned to each woman based on her age, race, and occupation.[2] For comparative purposes, the third column of Table 14 contains a similarly constructed pseudo earnings function for women in the 1960 census.

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[2] Therefore, by construction, regressors must operate exclusively through occupational assignment. In essence, this income weight gives a metric that summarizes some very complex movement across occupations.

Table 14 identifies one deterrent to work by married women at the beginning of this century: Their wages were 30 percent lower than those of single women. In choosing a job consistent with their home and family responsibilities, married women in 1900 apparently paid a considerable price in forgone wages. However, by 1960, the wage differentials among women in different marital states were small. The reasons for the elimination of the wage penalty associated with marriage must be central to any explanation for the growth in the female work force.

Table 15 contains two 1900 logistic labor supply equations, estimated separately for married women and for all women. Given the size of the wage deficit, it is not surprising that marriage stands out as the principal barrier to labor force participation in 1900. Yet, despite the low rates of participation by married women, their logistic function looks amazingly similar to contemporary participation equations. For example, an increase in husband's pseudo income reduced the probability that his wife worked, but his recent unemployment increased it. Children, especially under the age of six, were a particularly strong deterrent to market work among married women. Even in 1900, one would select declining fertility as an important condition permitting the numbers of female workers to increase.

These logistic functions identify two demographic forces that would play a part in subsequent developments. They also isolate another structural change that would take place within the female labor market. The two demographic factors are the nuclearization of the American family and the urbanization of the population. Two controls for extended family are included in these equations. Upward extendedness consists of households that include older generations, and downward extended families contain either parallel or younger generations. In either type, living in such families discouraged women's market work. As families became more nuclear over this century, the range of productive activities inside the home probably declined and market work of women rose

Table 15

LOGISTIC EQUATIONS FOR WOMEN'S LABOR FORCE PARTICIPATION

Variable[a]	All Women	Married, Spouse Present
Husband's months unemployed		0.082781 (3.74)
Husband's income		-0.00008079 (-2.58)
Illiterate	0.55786 (4.97)	0.46729 (3.58)
Husband illiterate		0.076444 (0.59)
Number of children		-0.041994 (-1.41)
Number of children under 6		-0.17273 (-2.59)
Married, spouse present	-3.6094 (-37.28)	
Married, spouse absent	-0.83404 (-5.05)	
Widowed or divorced	-0.10666 (-0.94)	
Upward extended family	-0.33530 (-2.75)	-0.070581 (-0.36)
Downward extended family	-0.31845 (-3.94)	-0.30411 (-1.92)
City size = top 10 in population	0.50094 (4.56)	0.051563 (0.24)
City size = top 11-25 in population	0.5314 (3.71)	0.25001 (0.96)
City size > 25,000 in population	0.54896 (4.74)	0.23695 (1.33)
City size = 10,000-25,000 population	0.51822 (3.98)	0.42829 (2.02)
Small town	0.31671 (3.10)	0.36188 (2.45)
Farm	-0.29857 (-3.28)	-0.37503 (-3.09)
Marriage 1-10 years		0.012658 (0.26)
Marriage 10-20 years		0.032953 (0.91)
Marriage 20+ years		-0.015873 (-2.04)
Age 14-24	0.19540 (17.04)	
Age 25+	-0.028886 (-7.30	
Race	1.7141 (15.62)	0.23867 (16.37)
Intercept	-1.7412 (-14.42)	-3.6495 (-15.96)
Log likelihood	1710.8	495.4

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[a] Controls are also included for region of residence, immigrant status, and time since immigration.

Urbanization is indexed by a set of dummies indicating the size of the place in which a woman lived. At least for single women, urbanization increased market work and living on a farm reduced work for women in all marital states. The decline of the family farm is an important component of our time-series explanation. In 1900, more than one-third of the women in our 1900 sample lived on farms. If all women left the farm, our equation predicts an increase of 6 percentage points in women's market participation.

In one respect, this 1900 function differs substantially from those with which we have become accustomed. In 1940 and all succeeding Census years, the propensity for women to work was positively related to her schooling. However, if illiteracy serves as an adequate proxy for schooling, it was the least-schooled women in 1900 who were workers. Between 1900 and 1940, the character of the labor market confronted by women altered in a way that reversed the association of work with schooling.[3]

THE CHANGING WOMEN'S LABOR MARKET AFTER 1900

With this 1900 female labor market as a background, we now attempt to identify some economic, demographic, and labor market developments that correspond in magnitude and timing to the years of rapid female labor force expansion. Table 16 presents summary measures of average labor force participation by birth cohort,[4] changes between adjacent birth cohorts in these participation rates, and some well-established correlates of female market work. While market participation by women was expanding before 1880, the pace was slow--less than one percentage point across every five birth years. Beginning with the 1881-1885 cohort, women's work grew more rapidly than previously, achieving its

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[3] The positive association of female education with market participation is a characteristic of developed economies. In less developed countries, this association is a good deal weaker and often reversed.

[4] These summary measures are derived by averaging labor force participation rates across the nine age groups in Table 3. The nine cells were filled in by interpolating between the known data. All other average series in Table 16 were derived similarly.

Table 16

COHORT SUMMARIES

	Changes Between Adjacent Cohorts in:			
Birth Cohort	Average Participation Rate	Average Participation	Cumulative Fertility	Education
1866-70	18.3			
1871-75	19.2	0.8	-.20	.11
1876-80	19.9	0.7	-.24	[illegible]
1881-85	21.4	1.5	-.21	.15
1886-90	23.3	1.9	-.18	.20
1891-95	25.7	2.4	-.20	.29
1896-1900	29.3	3.6	-.26	.52
1901-05	33.6	4.3	-.24	.45
1906-10	37.9	4.3	-.16	.59
1911-15	40.9	3.0	.07	.34
1916-20	42.4	1.5	.22	.47
1921-25	44.0[a]	1.6[a]	.28	.35
1926-30	46.8	1.4	.22[b]	.26
1931-35	48.0	2.5	.13	.22
1936-40	50.9	3.7	-.22	.31
1941-45	54.2	5.4	-.44	.35
1946-50	59.7	7.3	-.36	.34
1951-55	64.9	9.7	--	.27

[a] Beginning with the 1921-25 birth cohorts, lifetime participation represents averages over the life-cycle span completed by 1980. Beginning with the 1921-25 cohort, the first differences between cohorts reported in column two are evaluated at the same life-cycle point.

[b] Beginning with the 1926-30 birth cohort, cumulative fertility is evaluated at ages 45-49 and each successive cohort thereafter is evaluated at a 5-year earlier age interval.

full flower in the twenty birth-years between 1896-1915. Between the 1891 and 1911 birth cohorts, participation rose by 15 percentage points; in contrast, during both the twenty years prior to 1891 and those after 1911, participation increased by only 7 percentage points. With the birth cohorts of 1931-1935, higher rates of growth resumed, eventually surpassing earlier levels. Table 16 suggests that in searching for changes in the structure of female labor market, our empirical geiger counters may detect early signs with the 1881-1895 birth cohorts and the most pronounced signals beginning with the 1896-1916 birth cohorts.

Economists have long argued that real wage increases were an important contributor to the growth in the female labor force.[8] In spite of this emphasis, surprisingly little is known about long-term swings in female wages, especially for the early decades of this century.

Based on the wage series presented in Table 8, from a cohort perspective, the relative wage gain for women starts after the 1876-80 birth cohort and proceeds at an accelerating pace until the first five or ten years of this century. These are the same birth cohorts we identified in Table 16 as the initiators of the takeoff in female market participation. Between our 1900 Census year and 1920, the wage structure in the labor market was significantly altered to the benefit of women. Given this, it is not difficult to further speculate that the marriage wage penalty also narrowed significantly during these years.

This fundamental revision in women's wages in the early years of this century is in our view the catalyst that paved the way for the time-series growth in married women's work. After calendar year 1930, relative female incomes drifted slowly downward until 1960. A reasonable characterization from Table 8 is that relative wages of women were independent of birth cohort for women born after 1910. For these birth cohorts, the effect of secular real wage increases must rely primarily on a more elastic labor force response to female wages than to male wages, an empirical issue we return to below.

Time-series trends in education also deserve attention because schooling affects female labor supply, even independently of any influence through wages. Table 17 presents new estimates of average education attainment by sex for all five-year birth cohorts born after

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[8] The classic and still the best existing work is Mincer (1962). Since real wages have risen throughout the twentieth century, the absence of any participation increases before 1940 would pose a major problem to a wage-based theory. Our explanation faces the identical issue some forty years earlier. Real wages increased during the nineteenth century, but had no effect on participation of married women. The factors that occurred in the female labor market in the early part of this century that led to this change are the subject of this section.

Table 17

MEAN SCHOOLING LEVELS BY BIRTH COHORT

	Years of Schooling	
Birth Cohort	Males	Females
1951-1954	12.57	12.65
1946-1950	12.62	12.39
1941-1945	12.21	12.05
1936-1940	11.85	11.70
1931-1935	11.50	11.39
1926-1930	11.17	11.16
1921-1925	10.89	10.97
1916-1920	10.46	10.56
1911-1915	9.83	10.09
1906-1910	9.41	9.75
1901-1905	8.85	9.15
1896-1900	8.44	8.71
1891-1895	7.92	8.19
1886-1890	7.51	7.89
1881-1885	7.31	7.70
1876-1880	7.20	7.65
1871-1875	6.92	7.27
1866-1870	6.79	7.16

the Civil War.[6] A more complete characterization is provided in Table 18 for birth cohorts born 20 years apart.[7]

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[6] Our estimates are based on published Census data from the 1940 and 1970 Censuses and the 1979 CPS. Published data include single year of schooling distributions by five-year age groups separately by race and sex. Each cross-sectional Census provides an estimate of schooling distributions for a set of birth cohorts. By linking and blending these five cross-sections, one can span the birth cohorts listed in Table 17. Our years of education by birth cohort are averages of distributions across Census years, so that estimates for a single birth cohort could potentially come from five cross-sections. This averaging did not greatly alter the time-series description that one would obtain within any Census years. As is well known, birth cohort tracking across Census years shows unbelievably large increases in average schooling levels beyond any reasonable age of school attendance. This problem is particularly acute for blacks. This education inflation is often attributed to exaggeration of schooling accomplishments as education norms in society rise.

[7] Several adjustments, which are summarized briefly here, were made to the original published data. In the Census of 1950, the education group "college 4 or more" was divided into "college 4 and college 5 or

Table 18

SCHOOLING DISTRIBUTIONS OF SELECTED BIRTH COHORTS

Birth Cohort	Years of Schooling								
	0	Less Than 5	Less Than 9	8	Less Than 12	12	More Than 12	16	College Degree
Men									
1866-1870	7.5	21.1	77.8	35.5	85.8	9.0	5.2	1.6	1.9
1886-1890	5.7	17.4	66.3	28.4	79.3	12.0	8.8	2.3	3.3
1906-1910	1.4	6.6	41.6	20.3	61.5	23.1	15.4	4.6	6.3
1926-1930	0.7	2.8	17.4	8.2	38.6	42.3	19.1	5.7	7.7
1946-1950	0.4	1.5	6.6	2.3	19.1	45.6	35.3	12.9	15.9
Women									
1866-1870	[illegible].5	26.0	82.1	33.6	88.1	5.7	6.2	2.2	3.3
1886-1890	6.4	21.6	71.9	28.2	82.1	8.6	9.0	2.8	4.6
1906-1910	1.8	8.8	47.5	22.3	67.0	18.0	15.0	4.7	7.8
1926-1930	1.0	3.9	22.8	10.5	43.5	31.2	25.3	8.7	14.2
1946-1950	0.5	1.2	7.8	3.0	19.4	37.6	43.1	17.6	20.4

Progress in education was not uniform for either sex throughout this long historical time span. To isolate important subperiods, Table 19 lists increases in school completion between birth cohorts born ten years apart. The last column in this table measures the extent to which secular trends differed by sex. Starting with those born between 1896 and 1900, schooling levels expanded much more rapidly than they had previously. Mean education of both men and women now rose approximately one year per decade, rather than the one-third of a year per decade that was typical previously. This acceleration across birth cohorts would last 30 years. Beginning with the 1921-25 birth cohort, the rate of

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more" using the relevant cohort's distribution between these categories in 1960. Second, in published data, grades 1 and 2, 3 and 4, and 5 and 6 were combined for the 1950, 1960, and 1970 Census. The 1960 and 1970 data were allocated within these groups using the 1-100 decennial tapes. For 1950, the 1960 data were used to adjust for the relevant cohort. Thus, in each Census we end up with single year of schooling distributions (except for "more than college") for all five-year age groups starting with ages 25-29 and ending with ages 70-74.

Table 19

TRENDS IN EDUCATION COMPLETION: INCREASE IN MEAN YEARS OF SCHOOLING BETWEEN BIRTH COHORTS SPACED 10 YEARS APART

Birth Cohort[a]	Men	Women	Men - Women
1938-48	0.77	0.69	0.08
1928-38	0.69	0.54	0.15
1918-28	0.71	0.61	0.10
1908-18	1.06	0.82	0.24
1898-1908	0.96	1.04	-0.08
1888-98	0.93	0.81	0.12
1878-88	0.31	0.24	0.06
1868-78	0.42	0.49	-0.07

[a] The years listed are midpoints of the birth cohort intervals.

advancement slowed, with each new decade now witnessing only about a two-thirds increase in mean schooling between birth cohorts.

To a large extent, boys and girls shared a common heritage in the history of American schools, but there were some differences. Until fairly recently, average completion levels were slightly higher for women than for men.[*]

Male schooling levels rose slightly faster than female levels, so that among more recent birth cohorts, men have more schooling than women. This trend in favor of men was quite small until the 1911-15 birth cohorts. For generations born after 1911, men's education rose one-half a year more than women's. The reason for this differential trend appears to be an earlier and more rapid expansion in college attendance for men.[9]

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[*] More important than any mean disparity, however, is the considerably higher dispersion in schooling among men. Men were much more likely than women to be located at either tail of the schooling distribution. The proportion of men who either did not finish elementary school or who graduated from college is much higher than similar proportions for women. Although female elementary school graduates were more likely to finish high school, male high school graduates had a much higher probability of obtaining a college degree. The extension of universal high school actually led to a reduction in transition probabilities beyond high school, a nice historical example of heterogeneity in transition probabilities.

In some important work, Goldin (1983) has argued that rapid increases in female schooling and the emergence of clerical jobs were central to the growth in female labor supply. Temporal correspondence between the more rapid rise in participation and in our schooling series, as summarized in Table 16, does suggest that American schools were not bit-players in transforming the role of American women at work. For example, the two-year increase in average female schooling between 1896 and 1916 is coincident with a 15-percentage-point increase in participation. In contrast, during the 20 years before this spurt, schooling levels rose by 0.9 years and participation by 6.7 percentage points. Similarly, in the 20 years that followed, schooling increased by one and one-third years and participation by 6.9 years percentage points.

It was not simply the increase in number of years of schooling across these birth cohorts that broke down the constraints limiting women's work. Table 20 lists school continuation probabilities, evaluated at the critical elementary and high school completion points. The acceleration in school completion that started with the 1891-95 birth cohort clearly reflects a sharp expansion in high school attendance. Previously, less than one-half of men and women who completed the eighth grade received any additional schooling and fewer than one in three finished high school. Between the 1891 and 1921 birth years, universal high school attendance became the norm. Not only did schooling increase rapidly over this period, but also, with the development of the high school, the character of women's schooling was altered,[10] with the learning acquired presumably more useful in the labor market.

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[9] From 1912 to 1931, the percentage of high school male graduates who completed college rose from one in five to one in four. At the same time, the proportion of female high school graduates who completed college actually fell. In the last decade, this disparity has eroded, so that men and women are now almost equally likely to attend college.

[10] Goldin (1983) argued that schooling played an unusually instrumental role in shaping the growth in the female work force. She reports that *median* years of schooling increased by almost 3 years for birth cohorts born between 1900-1910. In her view, this represented a sharp and discontinuous departure from the past (as well as the future) for these special birth cohorts. Because these birth cohorts also

Table 20

SCHOOL CONTINUATION PROBABILITIES

	Men				Women			
	Elementary School Graduates		High School Graduates		Elementary School Graduates		High School Graduates	
Cohort	Go on	Complete High School	Go on	Complete College	Go on	Complete High School	Go on	Complete College
1946-50	96.9	84.7	53.4	25.4	97.6	84.5	43.7	19.7
1936-40	93.2	75.2	44.3	23.4	94.9	75.2	33.6	14.4
1926-30	88.1	64.5	44.8	25.1	91.0	67.6	31.1	12.6
1916-20	82.6	58.6	39.8	19.3	84.4	60.0	30.5	12.2
1906-10	70.2	44.1	45.6	23.6	74.2	49.0	40.1	16.6
1896-1900	58.6	35.9	50.0	25.2	62.6	39.6	42.8	16.5
1886-90	49.9	31.3	51.3	26.3	54.3	33.4	42.3	15.7
1876-80	44.2	29.0	50.2	27.0	48.8	30.9	38.9	14.9
1866-70	34.7	23.2	51.9	27.8	38.5	24.6	36.8	13.5

Because the period of rapidly increasing relative female wages predates this increase in their education, other events were indeed stirring within the labor market. In particular, alongside its growing numbers, important changes in the occupational structure of the female labor force were also under way. The central development, as Goldin

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exhibit a large growth in married women's labor participation, education plays a critical part in Goldin's historical work.

The series we present here differ significantly from hers in the magnitude of the secular changes in education and to a lesser extent in its timing. The problem with Goldin's education series is the use of medians, a treacherous statistic for tracking time-series changes. Medians tend to get stuck on nodes at common education values, such as the elementary and high school completion levels. Even if education distributions are shifting upwards in a steady progression over time, series that rely on medians will show a sharp and abrupt change as the distribution gets unstuck at elementary completion and moves toward the next common value, high school completion. This in fact is what accounts for the implausible 3-year increase over a 10-year period as reported by Goldin. The timing differences between the two series are less dramatic. Our education series takes off 5-10 years earlier than hers and continues to expand at above-normal rates for 10-15 years longer.

argued, was the emergence of a large clerical sector, and it is this occupation that we summarize here. Table 21 presents the distribution of working white women in the 10 principal Census occupation categories for all years 1890-1980. In 1890, fewer than 3 percent of white working women were in clerical jobs. In 1920, the figure was 22 percent. In another thirty years, in 1950, the figure had risen to 31 percent.

Occupational change typically takes place mainly across cohorts. With this in mind, Table 22 presents the proportion of women who were in clerical jobs by birth cohorts. In the space of 15 years, the clerical group went from a relatively minor part of the female work force to one employing more than one-third of all new female workers. Among women born in 1881-85, who would enter the job market at the turn of the century, fewer than one in ten were engaged in clerical employment. By the 1896-1900 cohort, one-third settled into clerical jobs. This relative growth in clerical employment took place largely at the expense of service work, particularly as domestic servants, and to a lesser

Table 21

OCCUPATIONAL DISTRIBUTIONS OF WHITE WOMEN BY MAJOR CENSUS CATEGORIES

Occupation	1890[a]	1900[a]	1910[b]	1920[c]	1930	1940	1950	1960	1970	1980
Professionals	11.0	12.1	12.3	16.2	18.0	15.0	13.9	14.5	17.3	18.7
Farmers	11.1	9.8	3.6	3.0	2.1	1.0	0.1	0.5	0.0	0.1
Managers	2.6	2.6	2.3	3.0	3.6	4.4	5.1	4.3	3.9	7.3
Clerical	2.6	4.9	12.3	22.0	25.6	25.6	31.3	34.4	37.5	35.8
Sales	2.2	3.8	6.7	7.6	8.4	8.4	9.1	8.8	7.4	6.4
Craft	1.8	1.8	1.7	1.5	1.2	1.3	1.8	1.4	1.8	1.8
Operative	30.9	28.8	26.0	22.1	18.0	21.2	20.9	18.6	15.8	11.7
Service	35.4	33.4	28.2	20.3	20.7	21.3	14.6	16.0	15.1	16.2
Farm worker	1.8	2.1	5.4	2.6	1.5	0.1	2.2	0.1	0.0	0.1
Laborer	0.7	0.1	1.6	1.9	1.2	0.1	0.7	0.1	0.1	0.1

[a] 25-64 age group.

[b] 10-75 age group.

[c] 20-64 age group for 1920 and all succeeding Censuses.

Table 22

PROPORTION OF WHITE WOMEN IN CLERICAL OCCUPATIONS

	Age									
Birth Cohort	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64
1826-30										1.0
1831-35									1.0	
1836-40								1.0		1.0
1841-45							1.0		1.0	
1846-50						2.0		1.5		
1851-55					2.0		1.5			
1856-60				3.9		3.1				
1861-65			3.9		3.1					
1866-70		4.4		7.8						4.8
1871-75	4.4		7.8						6.8	
1876-80		8.4						9.1		9.0
1881-85	8.4						12.2		10.9	
1886-90						16.1		14.0		14.1
1891-95					20.8		16.9		17.8	
1896-1900		35.3		28.0		21.8		23.6		22.1
1901-05			34.0		26.6		23.9		26.7	
1906-10		37.1		30.2		26.9		28.0		28.0
1911-15			30.1		26.9		29.0		29.8	
1916-20		31.2		30.8		31.2		33.3		32.6
1921-25			40.2		35.3		36.5		34.1	
1926-30		49.3		38.1		37.0		35.1		
1931-35			41.9		36.7		35.4			
1936-40		51.6		37.1		34.5				
1941-45			38.8		32.9					
1946-50		48.8		34.3						
1951-55			35.5							
1956-60		42.4								

< 5.6 >

< 20.9 >

extent, operatives. Before the emergence of clerical work, over 60 percent of employed white women were either operative or service workers.

The clerical sector opened up a whole new set of jobs to women that presumably lessened the conflict between work and marriage. One such dimension is illustrated in Table 23, which lists the total number of women with clerical jobs for selected birth cohorts. The life-cycle pattern of exit and subsequent reentry suggests that the cost of career interruptions may have been small in clerical work. The large growth in demand for clerical workers is the most likely cause of the shift upwards in women's relative wages documented in Table 8 and the dissipation of the wage penalty for married women.

Not all changes in female employment across birth cohorts can be assigned the pure cohort interpretation that we are pursuing here--that is, as being due to family background and schooling effects, which are largely immutable following entry into the labor market. For

Table 23

NUMBERS OF FEMALE WORKERS

(In thousands)

Birth Cohort	Age: 20-24	30-34	40-44	50-54	60-64
All Clerical					
1876-80	71		41	25	
1896-1900	550	250	193	279	205
1926-30	1038	646	953	1066	
1946-50	1853	1614			
Secretaries, Typists, Receptionists					
1876-80	27			13	6
1896-1900	265	104	67	78	53
1926-30	412	215	343	366	
1946-50	830	565			

example, the extreme departure of the 1896-1905 birth cohorts from earlier birth cohorts reflects in part the labor market effects of World War II.[11] To see this, trace the life history of the 1900 birth cohort in Fig. 1. The sharp upswing in their employment rates around age 40 coincides with the beginning of the war. Other cohorts show a similar war bulge that starts at the age they were when the war began.[12]

For birth cohorts with their childbearing years behind them, World War II clearly had a legacy that lasted far beyond its conclusion. For example, in terms of average lifetime participation, the 1896-1900 birth cohorts' rate exceeded that of 1881-85 (the last birth cohorts without a potential war effect in Table 3) by 7.9 percentage points. Following the war, however, the difference was 11.5 percentage points, while before the war it was only 5.1 percentage points.

In contrast, the war's long-term effect on younger women is more problematic. Women who were less than 30 at war's end thereupon left the labor market and did not return until the end of their childbearing. The war's impact on women who first entered the labor market after 1945 is even more questionable. Table 3 shows that the rising labor market participation among more recent cohorts largely represents a return to prewar patterns that were temporarily interrupted by the postwar baby boom.

Alongside these changes in women's role in the labor market, fundamental demographic swings were also under way. Fertility obviously ranks as the most important, and any cogent explanation must incorporate the interactions between fertility and female labor force behavior. Our cohort summary in Table 16 illustrates the close links between fertility and the willingness of women to work. The slowdown in the secular rate of growth in participation that begins with the 1916-20 cohorts corresponds to the baby-boom period, when cumulative fertility was rising. Similarly, the 1936-40 cohorts, when we return to the larger increases in participation, coincide with the declining fertility of the baby-bust cohorts. However, one can easily overstate the importance of fertility. Cumulative fertility was higher for the 1936-40 birth cohorts than for those born between 1891-95, but the average lifetime participation of the 1936-40 group (50.9) was twice as large as that of the 1891-95 cohorts.

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[11] In Tables 3 and 5, we identify the time period during which each birth cohort passed through the war by asterisks.

[12] The role assigned to World War II in altering the labor market behaviors of women has been controversial. Some view it as a catalyst that permanently altered women's (and men's) view of their appropriate labor market role. However, at least one more empirically based study reports no war effect on female participation (Goldin 1983). Our cohort work profiles suggest a more complex influence that varies across birth cohorts.

A standard exercise in the pre-Mincerian era was to evaluate the influence of demographic factors on rising female participation rates.[13] The conclusions reached were always the same. Demographic effects were small and, if anything, actually slowed the rate of growth. We update the exercise of these pioneers in Table 24 by standardizing female participation rates to conform to the 1940 age, race, and marital-status distribution. We also repeat their conclusion. When viewed over the long term, demographic changes remain of minor importance. Only marital status matters, and it acts as a depressant. Female participation would have grown more rapidly between 1940 and 1960 (and less thereafter) if we had standardized with the 1940 marital distribution. The swing in marriage rates we discussed above affects the timing, especially for younger women, but the longer-term growth in the female labor force reflects something far more fundamental than the demographic composition of the population.

Table 24

STANDARDIZED FEMALE LABOR FORCE PARTICIPATION RATES

Characteristics Adjusted	1970	1960	1950	1940[a]	1930	1920	1900	1890
Actual	49.2	40.7	33.0	29.4	25.4	22.9	19.7	17.4
Age, race	49.1	40.6	33.3	29.4	25.0	22.3	18.5	16.1
Age, race, and marital status	51.2	44.2	36.3	29.4	--	--	17.4	--

[a] 1940 weights are used.

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[13] For example, see Bancroft (1958), Durand (1948).

CONCLUSION

In this section, we searched for determinants of the long-term growth in the fraction of women who work. We began by describing the principal characteristics of the labor market that women faced in 1900. By describing the structure of women's wages and labor supply in the first year of this century, we hoped to identify how that labor market must have been altered to enable the expansion in the number of women who joined the labor force.

The labor market in 1900 was not hospitable to working women, especially married women. In that year, marriage virtually precluded work by white women, with only 2 percent of such women in the labor force. One reason was that the wages married women could earn were far lower than those of comparably qualified single women--30 percent lower, by our estimates. The majority of married women who did work in 1900 were employed as domestic servants, jobs that offered at least some compatibility with their homemaking responsibilities.

Another important characteristic of the 1900 labor market was that working women were mostly less educated women and those whose husbands had low incomes or were unemployed. While even contemporary women are less likely to work as their husbands' income rises, all studies since 1940 show that the likelihood of women working increases with their education. Since this was not the case in 1900, the character of the labor market confronting women must have altered in some fundamental way that reversed the association of work with schooling.

The other deterrents to market work in 1900 that we identified were more conventional. Even in 1900, having large families reduced the likelihood of women working. So did living in families that extended across generations (e.g., with grandmothers and older daughters at home). Finally, women who lived on farms were less likely to be members of the paid labor force. In 1900, more than one-third of women lived on farms.

This 1900 labor market, which proved to be so inimical to women's work, changed significantly in succeeding decades. Beginning with women who entered the labor market from 1900 to 1920, participation rates grew much faster than they previously had. Our analysis points to several important structural changes in the labor market that women faced during this century. The most important was a sharp increase in women's wages between 1900 and 1920. Across these years, women's wages increased 16 percent faster than wages of men. At the same time, the wage penalty for married women was gradually eliminated. By 1960, we find that there was very little difference in the women's wages across various marital categories.

The principal reason for the sharp increase in women's wages in the early years of this century was the emergence of clerical employment. Roughly between 1900 and 1915, the clerical sector was transformed from being a minor part of the female work force to one employing more than a third of new female workers. That growth took place largely at the expense of employment as domestic servants. One advantage of clerical jobs for women is the lessened conflict between work and home. In particular, women found it easier to withdraw from the labor market during their childbearing years and return to the labor force later in a clerical job.

Other factors also spurred the long-term increase in the number of women working. Coincident with the time period of the most rapid increase in female employment was a significant rise in school completion among women, largely due to a sharp rise in high school attendance. It is well established that women's employment increases with their education, especially with the completion of high school and attendance at college.

In addition, our research identified three demographic forces that contributed to the long-term growth in the female labor market: the increasing nuclearization of the American family, the urbanization of its population, and the long-term secular decline in fertility. In 1900, many families were extended across generations, with grandmothers and older daughters living in the same households with mothers. In terms of the range of productive activities taking place, these homes often resembled small cottage firms. As families become more nuclear during this century, the labor available for such work diminished and many of those activities shifted out of the home.

Many women in 1900 lived on farms and many others resided in rural areas. Although these women often performed arduous tasks and worked long hours on the family farm, their work were so tied up with their homemaking duties that it was often impossible to distinguish home tasks from market work. Because of this, such women were not counted as members of the paid labor force. The decline of the family farm was an important contribution to the growth in the female labor force.

Not surprisingly, declining levels of fertility of American women also played a part in the long term entry of women into the labor force. In 1900, the typical woman had almost four children. By the 1970s, this rate had been cut in half, so that now American families are not even reproducing themselves. However, childbearing can easily be overrated as a cause of the long-run increase in women's work. For example, although women born between 1931 and 1935 had more children (3.2) over their lifetime than women born between 1871 and 1895 (2.9), twice as many of them worked, on average.

A popular view is that World War II, during which women worked in unprecedented numbers, served as a catalyst that permanently altered men's and women's view of women at work. However, our analysis suggests that the situation was more complicated. For women who ended the war with their childbearing years behind them, World War II clearly had a legacy that lasted far beyond its conclusion. These women worked in far greater numbers than they would have without the intervention of the war. In contrast, the war had only a slight long-term effect on younger women. These women were caught up in the high-fertility years of the baby boom and their labor force participation rates were actually below historical trends. In large part, the rising labor market participation in the last two decades represents a return to pre-World-War II patterns that were temporarily interrupted by the postwar baby boom.

Finally, our analysis suggests that other demographic factors, such as the age, race, and marital status of the population, had very minor effects on the long-term growth in women's work. These demographic factors, especially marital status, did affect the timing of the growth of participation, but in evaluating long-term trends they can be safely ignored.

V. WHAT REALLY HAPPENED TO WOMEN'S WAGES?

In spite of the dramatic transformation in numbers of women working, the data we presented in Sec. III indicated that the apparent "rewards" from work for the typical woman have scarcely changed. Throughout most of the post-World-War II period, and indeed as far back as 1920, wages of working women have remained a constant fraction of those of men. Many observers view that persistent wage differential as standing in stark contradiction to the growth in the female labor force. In the normal course of events, they have argued, the increased participation of women in the labor market would enable them to acquire more skills relevant to their jobs, whereupon their wages would increase relative to men's wages. But the standard wage series, as well as those we presented in Sec. III, indicate that this improvement in women's wages has not come about. In this section, we offer a resolution to that puzzle.

Because they did not exist, our resolution required that we construct skill distributions for all post-World-War II labor market cohorts. Our distributions consist of two dimensions: years of schooling and years of labor market experience. Our indexes show that convergence--or rather lack of convergence--between the sexes in skill-related characteristics among people who are working *now* differs greatly from trends in market-related skills of *all* men and women, evaluated regardless of whether they are or are not currently in the work force. Among current workers there is little evidence that either skill or wage disparities between men and women have narrowed over time. However, skill differences by sex in the entire population have converged, especially during the last decade. Correspondingly, our estimate of the relative wages of all women indicates more rapid wage improvement for women than for men. The chain of argument from expanded female labor force participation to additional market experience and higher wages is valid as long as one looks at population averages and not labor force means.

This section is organized as follows. We first describe the construction of our two dimensions of skill: education and years of work experience. In doing so, we also discuss differences in the trends in these series for the female workforce and population. Next, we derive the implication of these trends in underlying skills for secular trends in relative wages of the female workforce and population. Finally, we discuss the implications of our work for understanding the wage gap between women and men.

Education

Table 17 above presented our estimates of average education by sex for all five-year birth cohorts born after the Civil War. As we reported there, boys and girls shared a common heritage in the history of American schools, but we did find some differences. Male schooling levels rose slightly faster than did female, so that among more recent birth cohorts, men have more schooling than women. This trend in favor of men was quite small until the 1911-15 birth cohorts. For generations born after 1911, men's education rose one-half a year more than women's.

However, one complication in linking observed labor market outcomes to female schooling is that trends in education among female workers can be quite different from trends for all women. Two aspects of this distinction concern us. The first involves within-cohort movement over life cycles. After school-completion ages, the educational distribution of a cohort of women is essentially fixed over their lifetime. However, the education distribution of the female workforce for that cohort may and does vary over ages. Because it is the female workforce that generates observed lifecycle wage patterns, wage variation due to within-cohort variation in the education of the workforce should be netted out to retrieve true wage-experience profiles.

Figure 4, which plots the mean education of the female workforce for the 1934 birth cohort, indicates that this concern is not misplaced. Although the mean schooling of the female workforce always exceeds the average education of all women in this birth cohort, there are pronounced life-cycle swings. After reaching its peak at age 23, the education of the workforce declines continuously into the mid-thirties.

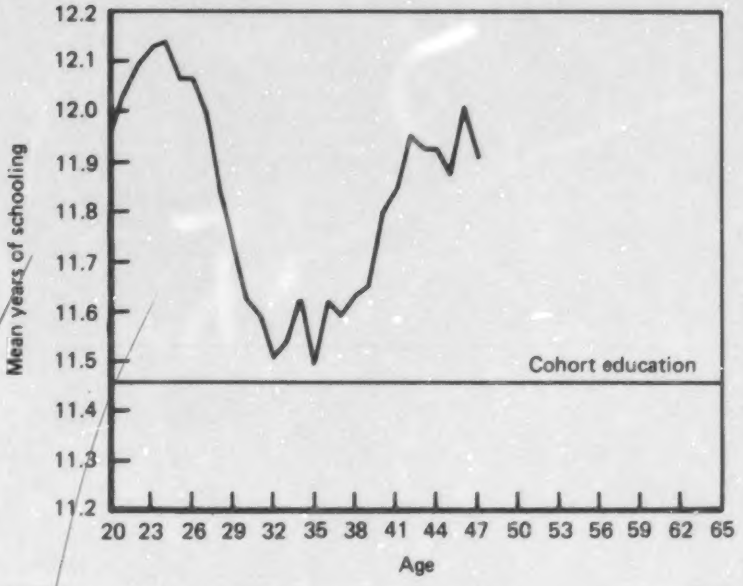

Fig. 4 —Education of the female work force
1934 birth cohort

The peak-to-trough change is more than half a year of schooling. After the mid-thirties, mean education of the workforce rises rapidly, almost achieving its previous high.[1] Given the magnitude of these life-cycle swings, correcting for the changing education composition of the workforce is essential if one is to isolate true wage-experience profiles.

The second dimension in which this distinction between the education of the workforce and of the population concerns us involves changes across cohorts. The growth in average schooling across generations of women has typically been larger than the observed increase in mean education of the female workforce. While this may result from more rapid increases in labor market participation at lower schooling levels, rising education levels of the female population will translate into a smaller rise in average education of all female workers even if participation rates within education cells remain constant over time.[2]

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[1] The shape in Fig. 4 reflects life-cycle participation patterns by education level. Between ages 23 and 35, participation rates decline most rapidly for more educated women. Similarly, after age 35, the increase in participation is greatest for women with a college degree. For a analysis of these life-cycle patterns by education, see Smith (1977).

To illustrate this point, Table 25 lists time series changes in average education of all women (the population average) and of women who were members of the workforce (the labor force average). With the exception of black women, the rise in the population average between 1940 and 1970 always exceeded the increase in labor force average. These differences between the population and labor force means were not trivial. Among white women, the expansion in average schooling of the population often exceeds by a half year the growth in education in the workforce.[3]

---

[2] The mean education of the labor force is $Ed^{LF} = \Sigma \; iLF_i \delta_i \; / \; LFPR$ where i represents years of schooling, LF_i is the labor force participation rate in education cell i, δ_i is the fraction of the population with education level i, and LFPR is the aggregate labor force participation rate. The mean education of all women is $Ed = \Sigma i \; \delta_i$. Thus, even if labor force participation rates within all education cells remained the same, an increase in average schooling in the population would raise the aggregate participation rate. As the above formula demonstrates, the mean education of the workforce would not grow as rapidly as the mean education of the population. The only assumption needed is that participation rates rise with education, a well-established empirical fact.

[3] Between 1940 and 1970, participation rates rose slightly more among less educated white women, particularly younger women. This distributional effect was supplemented by the general rise in labor force participation, the argument we outlined in the preceding footnote. In contrast, among black women, growth in participation was skewed towards the more educated and the increase in overall participation was smaller. These two account for the larger growth in mean education of the black labor force compared with the black female population. The data in Tables 25 and 26 actually refer to all nonwhites. However, more than 90 percent of nonwhites are blacks. Therefore, the trends in the series for nonwhite largely correspond to those for blacks.

Table 25

CHANGE IN MEAN EDUCATION OF WOMEN BY WORKFORCE STATUS

	All Races		White		Nonwhite	
Ages	All	Workers Only	All	Workers Only	All	Workers Only
			1940-1970			
20-24	2.03	1.85	1.83	1.62	3.56	3.64
25-34	2.07	1.75	1.85	1.35	3.47	3.67
35-44	2.25	1.98	2.04	1.39	3.56	3.90
45-54	2.31	2.09	2.21	1.60	3.28	3.67
55-64	1.89	1.86	1.86	1.51	2.85	3.39
			1970-1980			
20-24	0.23	0.16	0.18	0.09	0.63	0.67
25-34	0.84	0.94	0.82	0.89	1.07	1.14
35-44	0.87	1.01	0.85	0.98	1.02	1.13
45-54	0.65	0.77	0.57	0.67	1.51	1.68
55-64	0.87	0.83	0.82	0.75	1.52	1.61

The eventual impact on the education dimension of relative skills that men and women brought with them to the labor market are summarized in Table 26. This table indexes the extent to which male education grew faster than female education both among the population and among those in the workforce. Between 1940 and 1970, male education did increase more than female education, but the growing discrepancy between the sexes was considerably larger using workforce averages. Among white workers, male schooling rose by almost one year more than that of the female workforce. If we had used the workforce means, we would have added almost two-thirds of a year more schooling to the advantage of men than if we had monitored change between 1940 and 1970 with population-based averages.*

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*Among men, the education of the workforce also exceeds the education of the population. Since male mean participation rates exceed 90 percent, the difference between the male population and workforce averages is considerably smaller. Moreover, the growth in mean education of the male workforce was slightly larger than in the male population. The reason is that participation rates actually declined

Table 26

THE DEGREE TO WHICH MALE EDUCATION GREW MORE RAPIDLY THAN FEMALE EDUCATION, 1940-1970

	All Races			White			Nonwhite		
Ages	All	Workers Only	Difference Between Workers And All	All	Workers Only	Difference Between Workers And All	All	Workers Only	Difference Between Workers And All
20-24	.26	.64	.37	.27	.62	.35	.92	.86	-.96
25-34	.65	.92	.26	.67	1.09	.43	.88	.72	-.17
35-44	.50	.81	.31	.55	1.23	.68	.32	.03	-.29
45-54	.36	.61	.25	.39	.99	.60	.16	-.11	-.26
55-64	-.05	.31	.35	-.04	.57	.61	-.28	-.59	-.31

The bottom half of Table 25 indicates that this pattern reversed during the 1970s, when the rise in mean education of the female labor force actually exceeded that of the population of women. The reason is that labor force participation rates have risen so much more rapidly among more educated women that this distributional effect offset the counterinfluence of the general rise in labor force participation.

YEARS OF MARKET EXPERIENCE

Skills are acquired on the job as well as in schools, and as a result wages typically increase with duration of time in the labor force. Unfortunately, until recently labor force statistics have largely ignored accumulated labor market experience and have concentrated instead on contemporaneous measures of workforce participation. However, these contemporaneous measures, defined over different time dimensions, can be used to derive the experience duration consistent with them. In this section, we describe our time series of women's labor market experience and the methodology we used to construct it.

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somewhat among less schooled men. However, the trends in female-male differences documented in Table 25 were dominated by secular changes that occurred among women.

Our distinction between workforce and population means of education is even more critical when we consider the experience dimension of skill. Because of the tendency to stick to one's current labor force state, the labor market experience of workers will accumulate faster than the labor market experience of the population. For example, suppose that this "stickiness" is generated by an extreme model of heterogeneity in working probabilities (Heckman and Willis, 1977) such that workers always work and nonworkers never work. In that case the fraction of the population that is currently working ($\ell(t)$) will accumulate a year's worth of experience for each calendar year that passes. After n years the cohort of workers will have n years of experience and the population will have an average of l*n years. This divergence means that the observed wages of workers will rise along a path consistent with their higher rate of accumulation of experience.

If, during the course of this cohort's life, some of the nonworkers enter the labor force, they will bring with them zero experience and earn the associated wages of a new labor market entrant. The experience of the workforce will fall and so will its average wage, but the experience of the population will rise. Misleading inferences would then be drawn between the experience accumulation of the population and the average wage observed for workers.

Our estimates of the experience of the female workforce are derived from a mover-stayer model of labor force transition that is a simple combination of Markov and heterogeneity models. We consider two labor force states: working and nonworking. For individuals currently working, a fraction, sw, are "stayers" in the working state. This fraction has zero probability of leaving that state. Nonworkers have a stayer fraction sn, the fraction with zero probability of leaving the nonwork state. The remaining proportion of the population, $(1 - sw)\ell(t) + (1 - \ell(t))(1 - sn)$, are "movers" who transit between the work and nonwork states according to the simple two-state Markov model. Movers who are currently working have a probability p_w of working in the succeeding period, and nonworkers have a probability q_n of remaining as nonworkers in the succeeding period.

Let p be the probability of being a worker next period given current work. This probability may be expressed as $sw + (1 - sw)p_w$, an average of the transition probabilities for stayers and nonstayers. Similarly, q is the probability of being a nonworker next period given nonwork, $sn + (1 - sn)q_n$. If l(t) is the current fraction of workers in the population, then the equation of motion describing the evolution of l(t) is given by

$$l(t) = p * l(t - 1) + (1 - q) * (1 - l(t - 1)) \; . \tag{1}$$

The fraction of the population working can rise away from its steady-state level if p rises or q falls. That is, workers can become more attached to the work state or nonworkers less attached to the nonwork state. These two movements have very different implications for the experience of the workforce.

Let ew(t) denote the experience of workers and by en(t) the experience of nonworkers. The accumulation of worker experience is described by

$$ew(t) = \frac{p * l(t - 1) * ew(t - 1) + (1 - q) * (1 - l(t - 1)) * en(t - 1)}{p * l(t - 1) + (1 - q) * (1 - l(t - 1))} + 1. \tag{2}$$

The experience of the workforce is a weighted average of the experience of workers and nonworkers, with weights proportional to the probability of being a worker in period t. To this average is added one period of experience accumulated during period t. For nonworkers, experience accumulation is generated by

$$en(t) = \frac{(1 - p) * l(t - 1) * ew(t - 1) + q * (1 - l(t - 1)) * en(t - 1)}{(1 - p) * l(t - 1) + q * (1 - l(t - 1))} \; . \tag{3}$$

The experience accumulation of the population is given (after some algebra) by

$$
\begin{aligned}
(4)\quad ep(t) &= l(t) * ew(t) + (1 - l(t)) * en(t) \\
&= l(t) + l(t - 1) * ew(t - 1) + (1 - l(t - 1)) * en(t - 1) \\
&= l(t) + ep(t - 1).
\end{aligned}
$$

Note in Eq. (2) that an increase in $1 - q$, representing an increase in the probability of moving out of the nonworking state, will increase the weight attached to the experience of nonworkers in calculating next period's experience for workers. In other words, if the fraction of the population working rises because of an increased movement of nonworkers to workers, the average experience of the workforce will initially decline as long as nonworkers have less initial experience than workers. If the fraction working rises because of workers "sticking" to the workforce, then the experience of the workforce will rise.[5]

Estimates of the parameters of this model can be had with measurements of duration in these states. We obtain these data from three sources that, when combined, span the postwar period: (1) the *Current Population Survey* estimates of employment and weeks worked during the year; (2) tenure on current job, obtained from special CPS labor force questionnares; and (3) continuous time out of the labor force estimated from the Social Security Administration's Longitudinal Employee-Employer Data file (LEED). Briefly, information on weeks worked during the year and the employment rate at the beginning of the year allow for estimation of the annual probability of continuous employment, $sw + (1 - sw)*p_w$, and continuous nonemployment, $sn + (1 - sn)*q_n$. These parameters are estimated from the fraction of the workforce that worked 50 to 52 weeks and the fraction of the nonworkforce who worked zero weeks. From data on the tenure distribution we can form estimates of the fraction continuously employed for one year and for two years. These two data estimates are $sw + (1 - sw)*p_w$ and $sw + (1 - sw)p_w**2$ respectively, from which estimates of sw can be obtained. With these estimates, we return to CPS weeks distributions to calculate p_w. A similar set of observations on the fraction continuously out of work leads to estimates of sn.

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[5] In our exploratory empirical work, we rejected the two special cases of a pure heterogeneity model and a pure one-period Markov. If both p and q were equal to one, this model of accumulation would reduce to a model of extreme heterogeneity. In the Markov model, unlike the pure heterogeneity model, the population members are homogeneous except for their current work status. Eventually, as the process evolves, workers and nonworkers will transit between these states so that the experience of the workforce and the experience of the population converge toward one another regardless of their initial differences. Our investigation of the duration of "stays" in the work or the nonwork status showed that the Markov model did not describe these data accurately. For example, lengths of time out of the workforce violated the Markov structure--given that a women did not work last year, the probability of her not working for the preceding two years was much higher than the geometric decline rate predicted by the Markov model.

The calculation of labor market experience uses the features of the mover-stayer model to accumulate time spent working over the career from age 16 forward. Within a year, the estimated fraction of worker-stayers are assumed to accumulate 52 weeks of experience and nonworker-stayers to accumulate zero experience. The fraction who are movers $(1 - sw)\ \ell(t) + (1 - \ell(t))(1 - s(n))$ move according to the transition rates described above where, for purposes of calculation, the model is updated weekly and all transition probabilities are appropriately rescaled.[6]

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[6] At the end of the year we must make some assumptions about the transition of stayers into other states. If the fraction of the population who are worker-stayers, $sw*l(t)$, rises, we assume that this subpopulation is augmented from the pool of worker-movers. We further assume that the experience of workers switching from mover to stayer status is the mean of current worker-movers--a randomly chosen worker-mover becomes a worker-stayer. This means that the average experience of worker-stayers will have declined, while that of worker-movers remains unchanged. This calculation appropriately constrains the experience of the aggregate of workers to remain unchanged when a worker-mover is designated as a worker-stayer.

Similar recalculations of average experience are made if the worker-stayer fraction should decline. In this case, we assume that a randomly chosen worker-stayer moves to worker-mover status. In general this move will increase the average experience of both groups while keeping the experience of workers unchanged. Changes in the fraction of stayer-nonworkers, $sn*(1 - l(t))$, are treated similarly. We assume that stayer-nonworkers move only to mover-nonworkers and vice versa. The average experience of the origin group is assumed to be unchanged if one of its randomly chosen members leaves. The destination group's average experience will change so as to preserve the average experience of nonworkers.

SECULAR CHANGES IN EXPERIENCE

In this section, we describe the principal changes that have occurred in the underlying parameters that determine women's labor market experience. Figure 5 shows life-cycle graphs of the estimated fraction of stayers in the working and nonworking states for cohorts born in 1930, 1940, and 1950. The graph of sw, the fraction of the workforce who are stayers, declines initially from age 16 to 20 and rises gradually thereafter throughout the life cycle. This U-shaped movement is due to the entry into the labor force of high school graduates, who initially exhibit high turnover rates, and the subsequent exit of women during childbearing years. Those women who remain in the labor force tend to have high probabilities of continuing to work, a tendency that rises with age.

A similar pattern is shown in these figures for the life-cycle path of sn, the fraction of nonworkers who are estimated to have zero probability of leaving the nonwork state. This shows the same early career decline and subsequent sharp rise, but the fraction reaches its asymptote around age 30. As women end their childrearing years and reenter the workforce, those who remain out of the work force represent a subpopulation of women who have very low probabilities of ever working again. Figure 6 shows the stayer fractions for ages 25, 35, and 40 over time. These reveal gradual declines in the fraction of nonworkers who are stayers among women who are beyond childbearing years, and no systematic change in the fraction among younger women. Because women's labor force participation rates have been rising, these fairly stable fractions would show sharper declines if expressed as a percentage of the population.

The probability that a working woman remains employed for a year is $sw + (1 - sw)*\rho_w$, an average of the transition probabilities for stayers and for nonstayers. Figure 7 shows these probabilities by cohort and Fig. 8 by year. The life-cycle paths show that the transition probability from nonwork to nonwork reaches an asymptote in the early twenties and remains fairly constant throughout the remainder of life, while the transition probabilities from work to work rise gradually. This is another manifestation of the growing differentiation of workers

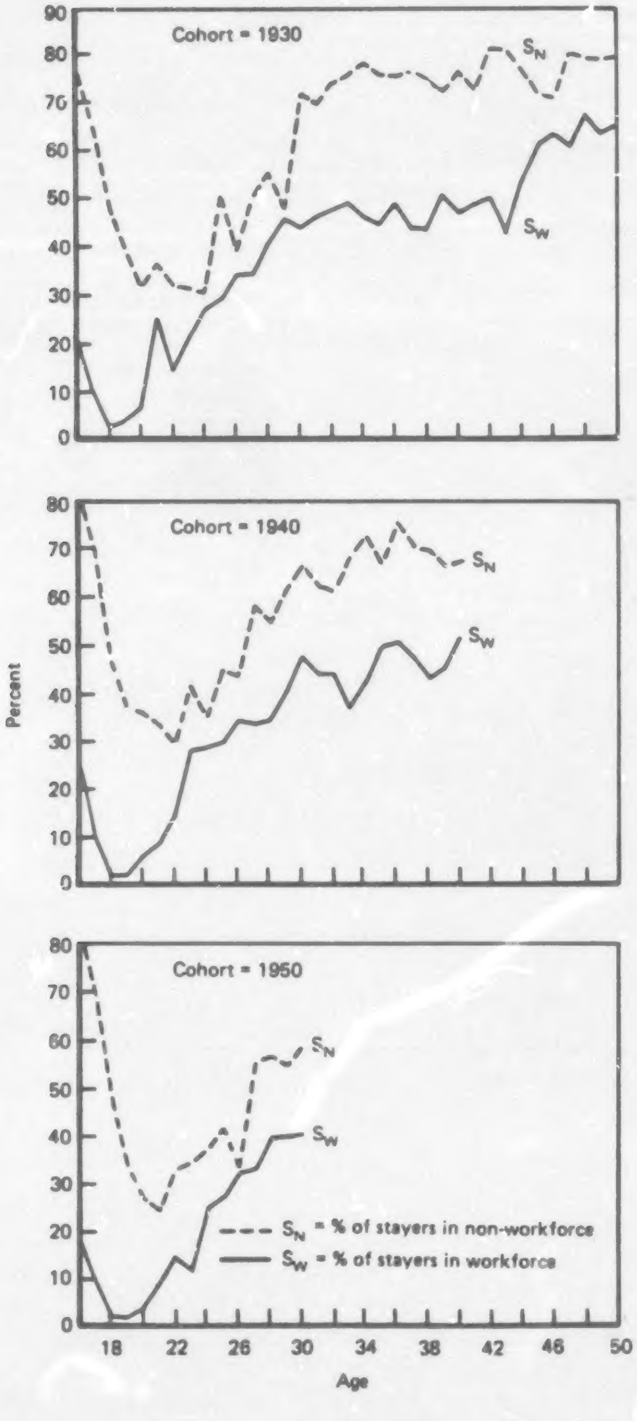

Fig. 5 — Percent of stayers in the workforce and in the nonworkforce, by selected birth cohorts

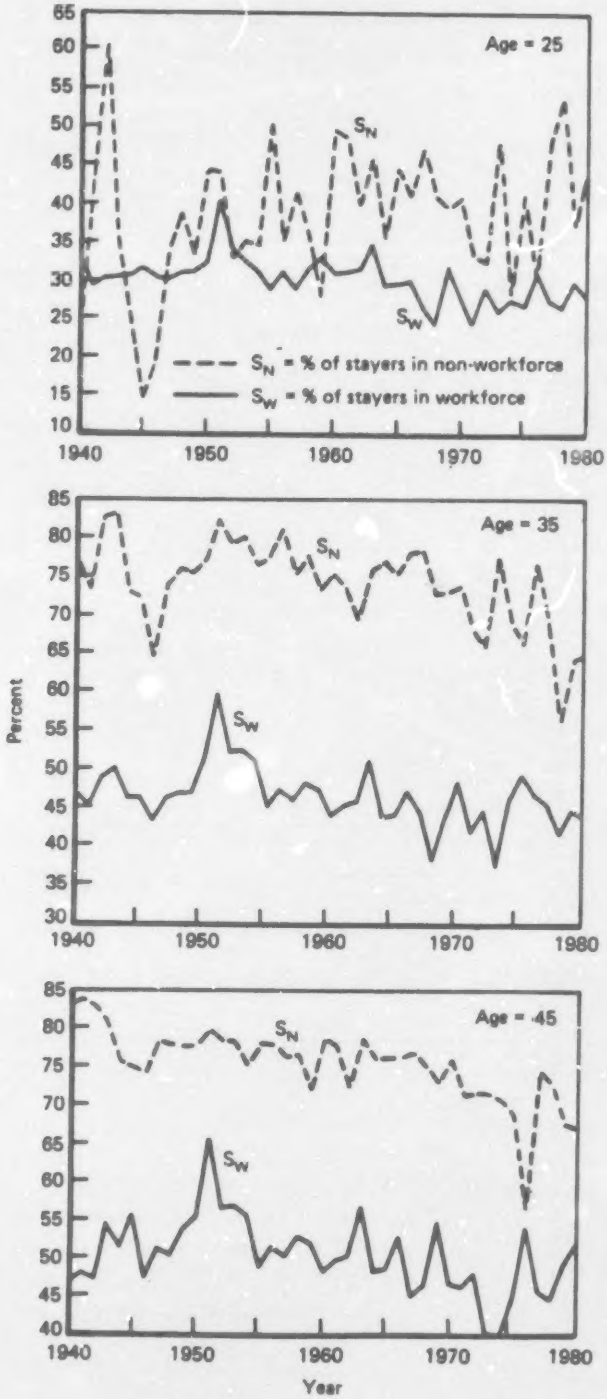

Fig. 6 — Percent of stayers in the workforce and in the nonworkforce, by age

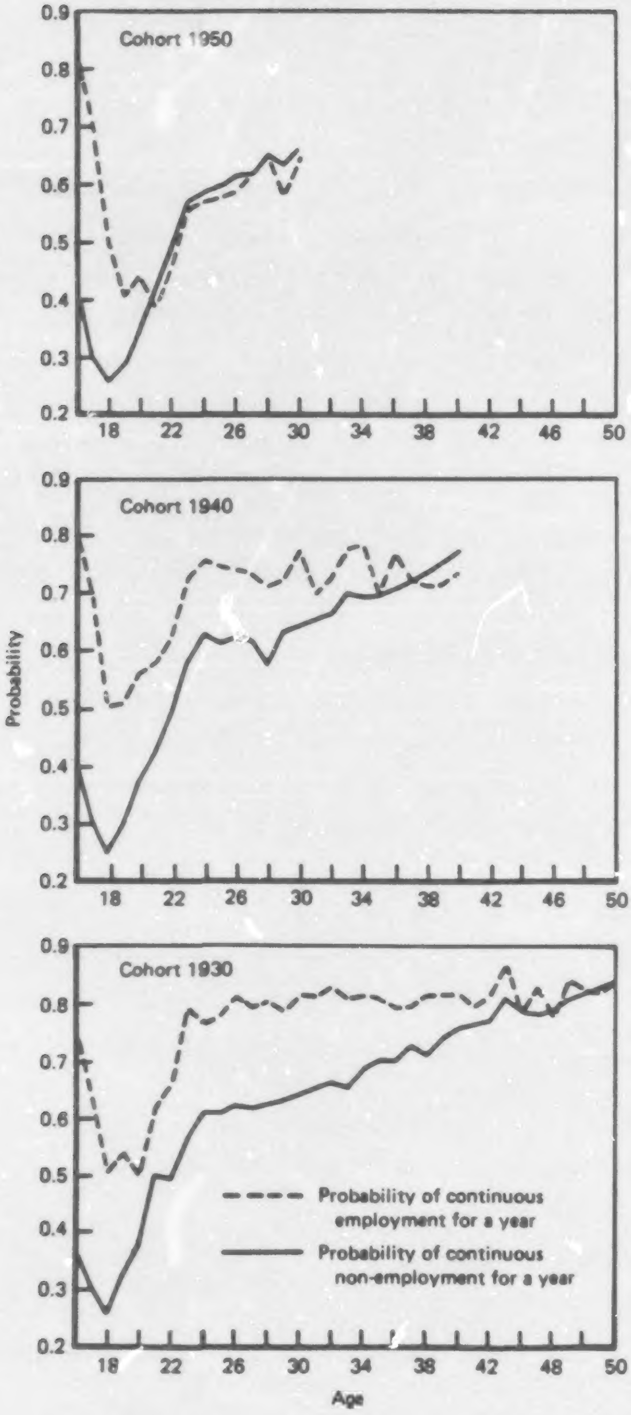

Fig. 7 — Conditional annual probabilities of remaining in work and nonwork status, by cohort

from nonworkers as the cohort ages. Figure 8 shows sharp declines in the probability of remaining in the nonwork state. Almost all of the increase in the employment ratio for women was due to the decline in this ratio. However, the probability of exiting from the work state did not change. Despite their enormous increase, women workers exhibit the same attachment to the workforce in 1980 as in 1950.

Figure 9 shows trends of labor market experience for three cohorts. The experience of the population is simply the summation of all past employment ratios. The experience of workers and nonworkers reflects the average experience for those groups at the date of measurement. Even though the identity of workers and nonworkers is changing constantly, the mover-stayer framework generates divergence between the experience accumulation of the population and the workforce. Because the stayer fractions for both workers and nonworkers rise throughout the life-cycle, there is a growing divergence between the experience accumulation of current workers and nonworkers. Toward the end of the career, the accumulation of experience for workers approaches the accumulation of age.

Figure 10 overlays the experience accumulations for workers and for the population for adjacent cohorts. A comparison of the 1930 and 1940 cohorts shows the effect on the experience of the population of rising employment ratios. However, the experience of the workforce is the same at every age. The entry of women into the workforce acted to hold down the experience of workers. The comparison of the 1940 and 1950 cohorts shows the same effect: The experience of the population rises much faster than the experience of the workforce.

Figure 11 shows experience by age group over time. For 20-year-old women, the movement of experience in the labor force and in the population over time has been identical. This is because the younger group exhibits much greater churning between worker and nonworker status, so that rising employment is quickly translated into rising experience for workers and nonworkers alike. For 30-year-old women, the experience accumulation of workers is damped as low-experience nonworkers enter worker status. For 40-year-old women, this damping is so severe that the experience of both workers and nonworkers has

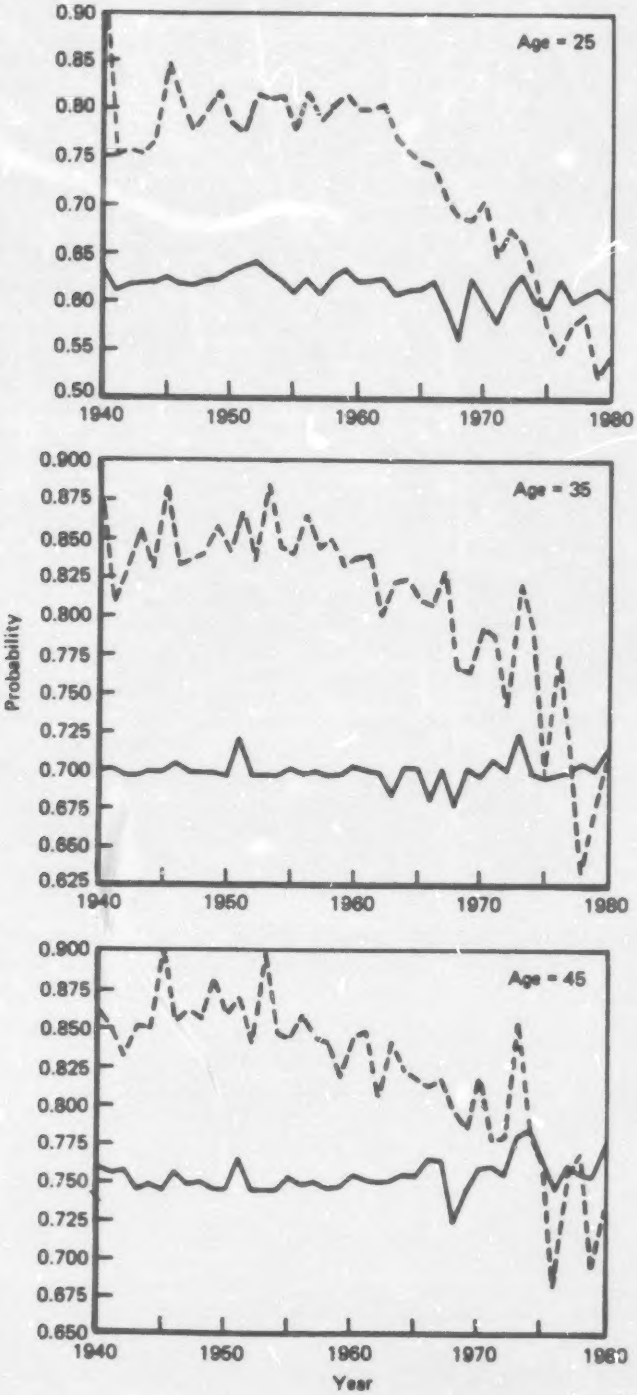

Fig. 8 — Conditional annual probabilities of remaining in work and nonwork status, by age

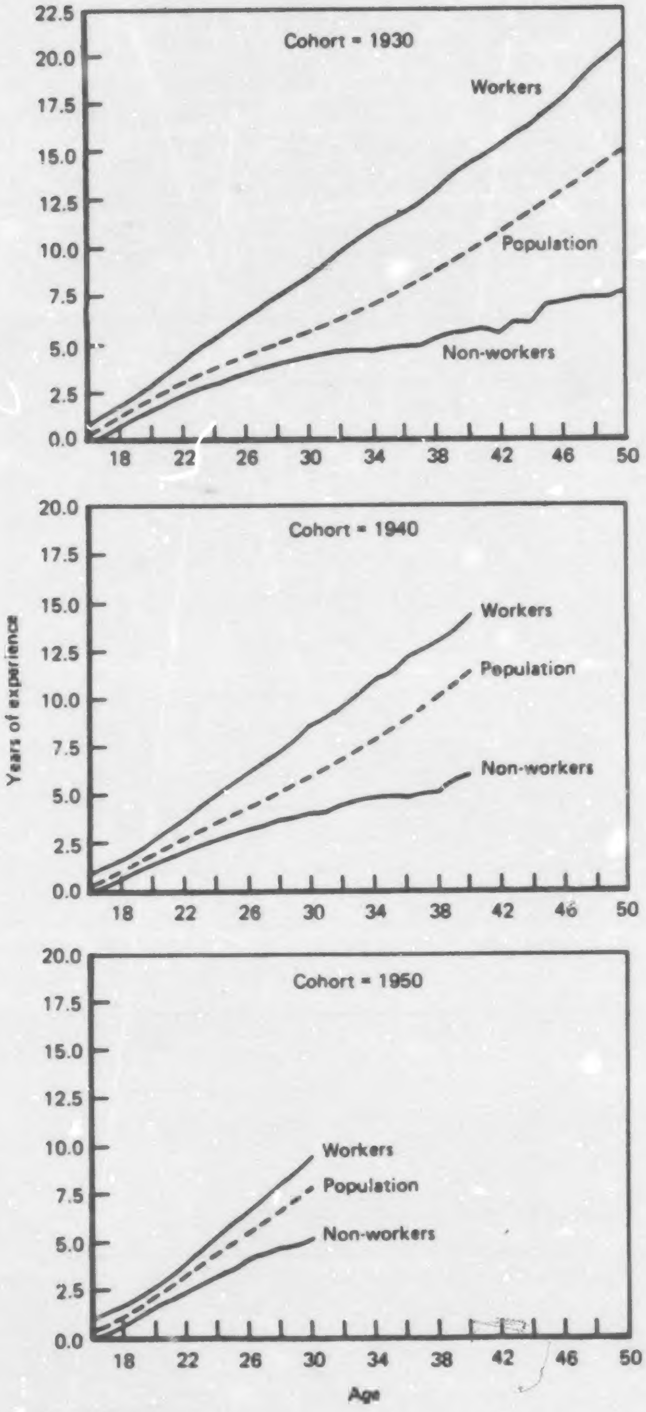

Fig. 9 — Life cycle experience by cohorts

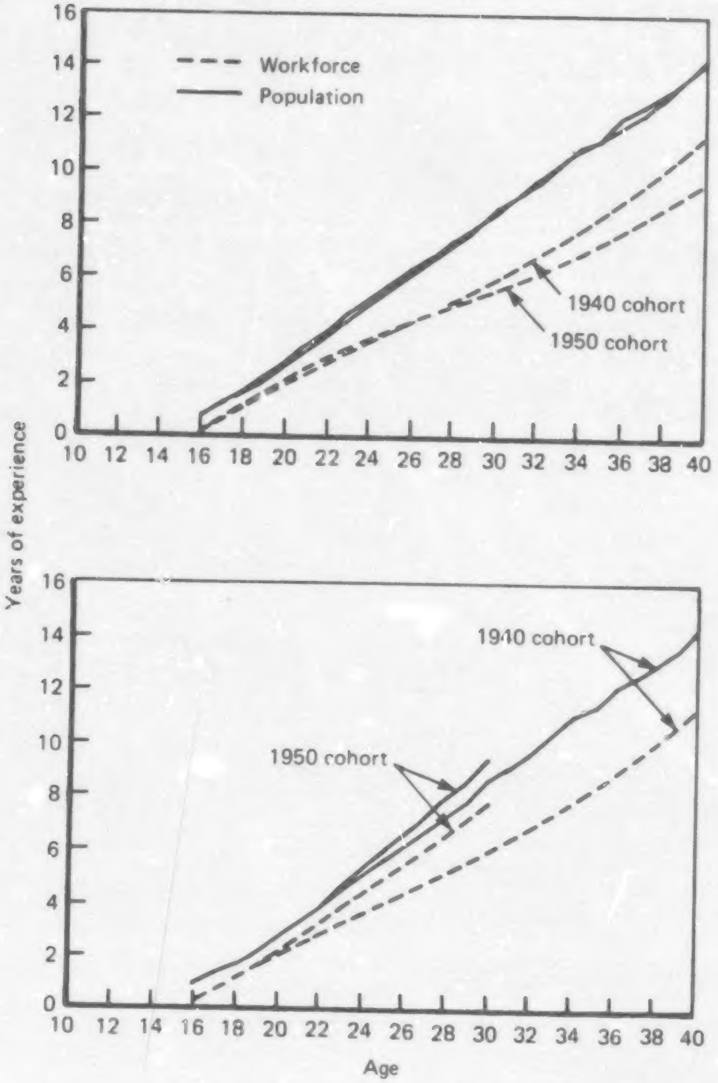

Fig. 10 — Life cycle experience

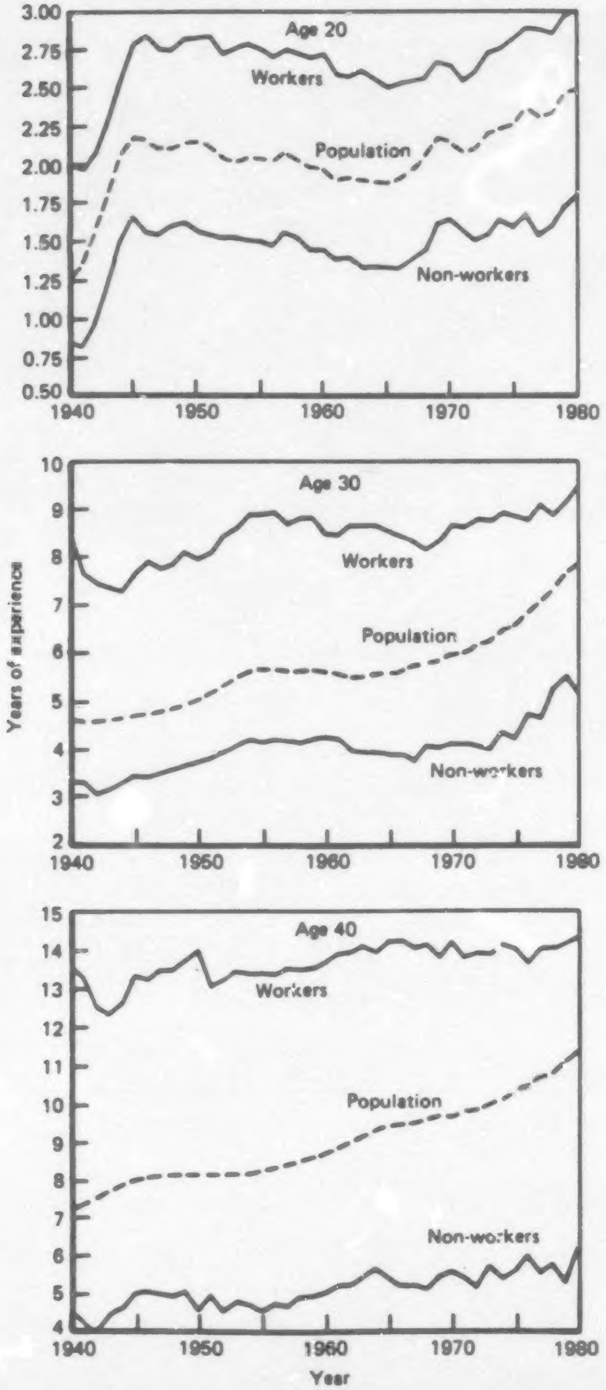

Fig. 11 — Secular trends in experience evaluated at selected ages

remained unchanged over the last 40 years while that of the population has been rising throughout. This phenomenon occurs because the average experience of workers is being held down by the addition of low-experience nonworkers. The experience of the nonworkers is held down because higher-experience nonworkers leave the worker state.

THE REAL TREND IN WOMEN'S WAGES

We next summarize the implications of our new measures of the education and experience of the female work force and population for recent trends in relative female wages. In doing so, we return our attention to the puzzle that originally motivated our research: Why have relative female wages remained constant in spite of the large expansion in the female labor market participation?

The analyses that we report here are based on disaggregated time-series data over the period 1950-1980. Over this 31-year time span, our observations consist of mean values at single years of age of education, experience, and weekly wages.[7] Our measures of education and years of market experience for the workforce and population are those discussed in the previous two sections. Weekly wages are defined as yearly income divided by weeks worked. For purposes of analysis, our data are arranged as a set of life-cycle histories for individual birth cohorts.

Table 27 lists a simple version of our wage function. The dependent variable in our wage function is the first difference in the ℓn female weekly wage within each cohort from one age to the next. The regressors are also first differences within cohorts of mean education and work experience (as a quadratic) of the female *work* force. We attempt to capture year-effects on the demand side by controlling for the average male wage in each year.[8]

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[7] For the subperiod 1967-1980, we used CPS micro files to calculate means at single years of age. Over the subperiod 1950-1966, CPS published tables exist on distributions of weeks worked and income. However, these published tables are provided only in 5-year and 10-year age groups. We smoothed this series using cubic splines approximations to obtain values at single years of age.

[8] Defined as the sum of the age-specific ℓn male wages in each year. All nominal variables are expressed in 1964 dollars.

Table 27

DEPENDENT VARIABLE: ℓn FEMALE WEEKLY WAGE
(First Difference Within Cohort)

Variable	Coefficient
Δ education of female labor force	.0950 (8.80)
Δ experience of female labor force	.0839 (6.52)
Δ experience^2 of female labor force	-.00214 (10.8)
Δ mean ℓn male wage in year	.5620 (8.28)
Intercept	.0119 (2.11)
R^2	.179

The estimates we obtained are conventional. An additional year of schooling raises female income by 10 percent. Wages increase with accumulated market experience, but this effect decays over careers. An extra year of market work raises incomes until the 20th year on the job, which covers most of the labor force segment of life-cycle for women. The coefficients of the yearly changes in male wages and the intercept should be read together. They are parcelling out the growth in real income over time, half of which is apparently absorbed by yearly changes in male wages.

Using our estimated wage function in Table 27, we have assigned a mean wage to all women in all age-year cells in our data. Our estimate of the mean weekly wage offer to all women differs from the observed average wage of all working women for three reasons. First, with positive correlation in participation probabilities across years, women who do not work this year will have less accumulated market experience than women who are currently working. Second, as we have seen earlier, working women have more schooling than the sample of women from whom they are drawn. Finally, for a host of other unobservable (to us) reasons, currently working women may receive higher wage offers than nonworkers would if they worked.[9] In combination, the forces represented by these three reasons are sufficiently important that time-series trends in relative wages in the workforce and in the population are quite dissimilar. The reason is that the convergence between the sexes in skill-related characteristics among workers differs greatly from the convergence in skills of all men and women evaluated independently of their current work status.

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[9] The final catchall category is the theme of much of the recent wage selectivity literature.

To calculate the mean wage of all women, we adjusted the mean wage of working women for the differences in average experience and education between current workers and the population.[10] The results of these adjustments are presented in Table 28, which lists female wages as a percent of male wages for working women as well as for all women. As a companion, we present our estimates of the accumulated market experience of the female workforce and of the female population in Table 29. We also summarize our earlier findings regarding changes in schooling of the female work force and population in Tables 30 and 31.

In 1980, relative to men, the wages of all women are significantly less than the wages currently received by women workers. Using the percentage discrepancy between the two series in Table 28 indicates the following. If women workers were paid 60 percent of the hourly wage of men in 1980, then the hourly wage of all women, including the nonworkers, would be only 53 percent of the hourly wage of men.[11]

The first half of Table 28, which lists relative wages among workers, confirms our earlier characterization of postwar trends in female wages. Overall, relative female wages showed little change between 1950 and 1980, with a U-shaped pattern between these years. Converting to an hourly wage base, in 1950 the hourly wages of women were 63 percent of those of men; by 1980 they were 80 percent. This

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[10] We also applied a simple wage-selectivity correction using a "λ" coefficient of .089, i.e., the coefficient on the inverse of Mill's ratio. The .089 figure is the average of the estimates presented in Smith (1980). The implication of this wage selectivity in unobservables is that wages of working women and of all women will converge as participation levels rise over time. Put differently, wages of the population will rise more rapidly than wages of the workforce. However, it turns out that this wage selectivity in unobservables is only a minor part of our total wage adjustment.

[11] This calculation ignores any supply effects that would in fact accompany the addition of all these women into the labor market.

Table 28

FEMALE WEEKLY WAGE AS A PERCENT OF MALE WEEKLY WAGE

	Age					
Year	20	25	30	35	40	45
Sample: Working Women						
50	83.0	73.2	62.4	53.9	49.1	48.3
55	86.8	68.1	56.7	51.5	49.7	49.9
60	88.7	68.3	53.7	47.4	45.0	45.6
65	92.0	71.0	55.1	51.3	50.3	49.2
70	73.1	64.6	49.3	44.6	45.3	44.4
75	72.5	65.5	52.9	46.8	44.5	41.1
80	74.8	68.3	58.4	47.4	49.6	45.4
Sample: All Women						
50	71.7	57.5	47.3	39.5	35.5	35.4
55	75.0	54.2	43.5	39.5	37.7	37.9
60	78.1	53.8	40.4	35.4	34.9	36.1
65	81.2	56.4	42.9	40.1	39.7	39.5
70	67.1	52.7	39.5	35.0	35.5	37.2
75	67.3	55.3	42.9	39.0	36.1	33.6
80	75.0	59.4	50.2	40.5	42.1	38.7

wage series among female workers parallels trends in education and years of market experience of the female work force. If we combine the effect of education and market experience, there has been little convergence in the underlying skill distributions of men and *working* women. Between 1950 and 1970, years of labor market experience for female "workers" increased on average by less than half a year. Over the same time span, the education of men rose by about one-third of a year more than did mean education of the female workforce. The stability in observed relative wages is consistent with the absence of any convergence in the skills of men and working women.

While the sex disparity in skills of the workforce was relatively stable, the skill differences between all men and women were in fact changing. We know that the expansion in market participation of women must raise the average experience of all women. However, as new labor

Table 29

YEARS OF LABOR MARKET EXPERIENCE

	Age					
Year	20	25	30	35	40	45
Sample: Working Women						
50	2.81	5.87	7.97	10.57	13.99	16.43
55	2.74	5.80	8.88	10.72	13.39	16.95
60	2.70	5.76	8.48	11.83	13.68	16.58
65	2.49	5.58	8.53	11.29	14.24	16.52
70	2.63	5.69	8.68	11.21	14.24	17.21
75	2.81	6.02	8.83	11.39	14.06	17.05
80	3.00	6.23	9.50	11.70	14.39	16.97
Sample: All Women						
50	2.14	4.08	5.04	6.29	8.13	9.87
55	2.02	4.03	5.67	6.73	8.23	10.20
60	1.96	3.92	5.61	7.38	8.71	10.43
65	1.86	3.97	5.57	7.40	9.42	10.99
70	2.13	4.29	5.98	7.68	9.66	11.91
75	2.25	4.93	6.58	8.37	10.32	12.28
80	2.47	5.27	7.85	9.46	11.40	13.35

entrants with less experience are blended into the current work force, average experience of all workers can decline. That is the story told in Table 29. Between 1950 and 1980, the increase in experience of the total female population is two to three years larger than that observed for the average female worker.

The disparity in trends between the workforce and population in years of work experience is also reflected in the relative wage series. In all cases but one in Table 28, relative wages of female workers were lower in 1980 than in 1950. In contrast, in every single case, our calculated wage of all women rose relative to male wages. This was especially true during the 1970s, when the rate of wage growth of all women was twice as large as we observe for working women. Converting to an hourly wage base, we estimated that in 1950 all women would receive 48 percent of the wages of men; by 1980, this had risen to 53 percent.

Table 30

CHANGE IN MALE EDUCATION RELATIVE TO FEMALE EDUCATION

	Age				
Year	20	25	30	35	40
Sample: Working Women					
1970-1950	.43	.60	.36	.42	.66
1980-1970	-1.1	.16	.11	.14	.18
Sample: All Women					
1970-1950	.05	-.0001	.05	.16	.27
1980-1970	-.32	-.32	-.24	-.17	-.15

It is important to remember that there is a downside to this relatively optimistic message of progress in the economic rewards to women. Women's wages may be rising more rapidly than commonly believed, but they are also lower relative to those of men than most economists thought.

Table 31

CHANGE IN WOMEN'S MARKET EXPERIENCE, 1950-1980

	Age				
Years	25	30	35	40	45
Sample: All Workers					
1970-1950	-.18	.71	.64	.25	.78
1980-1950	.36	1.53	1.13	.40	.54
Sample: All Women					
1970-1950	.21	.94	1.39	1.53	2.04
1980-1950	1.19	2.81	3.17	3.27	3.48

EXTENSIONS TO THE FUTURE AND THE PAST

How unusual were the last thirty years, and will the trend of women's wages for the remainder of this century replicate that experience? To answer these questions, we forecast and backcast our models to create education and work experience distributions of the labor force and population for all twentieth century work cohorts.[12] For all birth cohorts who were in the labor market at any time during 1950-1980, we estimated regressions for each of our underlying series. These regressions contained a set of 5-year birth-cohort dummies and a 5-year segmented age spline starting at age 16 to trace the average life-cycle path.[13] Initial (1950) and final (1980) observed values for each cohort were used to establish their life-cycle position.[14] From that position, we moved a cohort backward or forward using the estimated life-cycle function for that series. Table 32 contains the results of our simulations for women's work experience, while Table 33 lists women's relative weekly wages.[15]

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[12] To construct our experience series, we went back to first principles by creating future and past values for the basic parameters of the model summarized in Eqs. (1-4). That is, we imputed values for the stayers fractions, s_w and s_n, and the Markov transition probabilities, p_w and q_r. We used female employment rates from decennial Census data to fix past values of female employment rates. With these parameter values, the model of Eqs. (1-4) was used to forecast and backcast work experience for all work cohorts.

[13] We explored the possibility that the life-cycle path may have varied significantly by cohort. The only variables that did so were employment and participation rates. The average life-cycle path has altered in that the traditional decline in participation during childbearing years is much attenuated relative to the past. Because of this we included, for our employment and participation equations, interactions of the early segments of the experience spline with more recent cohorts.

[14] To reduce error variance in the starting values, we actually use a three-year average to obtain the initial values. The R^2 in all the predicting equations were all well in excess of 0.9. Therefore, at least over the period of real data, these forecasting equations described the actual series very well. Finally, we usually inspected each projection abd backcast to insure that predictions appeared reasonable.

[15] To value education and experience, we estimated a wage function with a set of cohort dummies and an experience spline. For the purposes of this exercise, we found that a more precise description (than an experience quadratic) of the true life-cycle wage path was required.

Table 32

"PROJECTED" YEARS OF WOMEN'S LABOR MARKET EXPERIENCE

	Age						
Year	20	25	30	35	40	45	50
			Sample: Working Women				
1910	2.53	5.34					
1920	2.62	5.57	8.74	11.80			
1930	2.34	5.55	8.97	12.04	15.38	18.51	
1940	1.98	5.05	8.54	11.08	13.55	15.85	17.54
1950	2.81	5.87	7.97	10.57	13.99	16.43	19.31
1980	3.00	6.23	9.50	11.70	14.39	16.97	20.64
1990			10.44	15.06	17.24	18.76	22.17
2000					19.63	24.07	26.57
			Sample: All Women				
1910	1.73	3.19					
1920	1.81	3.40	4.53	5.31			
1930	1.55	3.57	4.90	5.82	6.65	7.39	
1940	1.25	3.08	4.63	6.11	7.19	7.94	8.59
1950	2.14	4.08	5.04	6.29	8.13	9.87	10.85
1980	2.47	5.27	7.85	9.46	11.40	13.35	15.04
1990			8.66	11.57	14.74	16.23	18.04
2000					15.57	19.16	22.90

First, consider the past. The absence of skill convergence among workers alongside the steady narrowing of skill disparities by sex in the population, which characterized the 1950-1980 time-period, becomes even more pronounced when we backcast our model. While women have steadily added to their work experience over time, we find that snapshots of the female workforce in 1920 or 1930 would look amazingly similar to those that existed in 1950 and 1980. Based on our simulations, the typical female worker in 1930 actually had more accumulated labor market experience by age 40 than did the average 40-year-old female worker fifty years later in 1980. In contrast, between 1930 and 1980 there was almost a five-year increment in the total number of years worked for the average 40-year-old woman.

These trends in experience are translated into similar trends in relative wages in Table 33. Calculated over the workforce, relative wages of women in 1920 and 1930 are almost identical to those that prevailed in 1950. The lack of any long-term narrowing of the gender wage gap since 1920 as indexed by these simulations over the female workforce parallels the relative wage series of Table 8. Using either their relative occupational position or their relative education and experience, these two independently derived series both point to little aggregate change in the relative labor market position of female *workers* between 1920 and 1980. However, the bottom half of Table 33 indicates that significant changes in the relative wages of women were actually taking place during this time period. Relative wages of women were 15 to 25 percent higher in 1980 than they were in 1920 and 1930.[16]

What of the future? These sample composition effects, which have camouflaged reality for some time, have essentially run their course. Table 32 indicates that, for the first time in the twentieth century, the average experience of both the female workforce and the population will increase significantly over the next 20 years. A 40-year-old working woman in the year 2000 will have 5.2 more years of work experience than a 40-year-old working woman in 1980. The story on reported female wages during the [illegible] and 1990s will also be far different from what has occurred to date. For the remainder of this century, based on our simulations, we predict that, using either workforce- or population-based means, wages of women will accelerate relative to those of men. As Table 32 indicates, this is especially true for those young women who entered the labor market in the 1970s. By the year 2000, relative wages of those new young female workers should rise approximately 15 percent faster than those of young male workers.

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[16] Using the ratios of wage change in 1920 compared to 1950 would suggest that, on a hourly wage basis, women earned 43 percent of the wages of men in 1920. These are very rough calculations, used only for illustrative purposes.

Table 33

"PROJECTED" FEMALE WEEKLY WAGES AS A PERCENT OF MALE WEEKLY WAGES

	Age						
Year	20	25	30	35	40	45	50
			Sample: Working Women				
1910	74.8	71.2					
1920	77.4	72.6	63.7	55.6			
1930	69.7	72.5	[illegible]	56.2	50.3	49.1	
1940	61.0	71.6	63.4	54.7	48.5	47.7	46.7
1950	83.0	73.2	62.4	53.9	49.1	48.3	48.8
1980	74.8	68.3	58.4	47.4	49.6	45.4	47.4
1990			60.0	52.2	53.3	47.4	48.3
2000					56.5	52.1	50.3
			Sample: All Women				
1910	61.1	51.6					
1920	63.2	52.5	43.3	35.9			
1930	58.2	53.5	44.4	37.1	32.6	31.6	
1940	52.0	54.0	45.0	38.1	33.3	32.1	31.7
1950	71.7	57.5	47.3	39.5	35.5	35.4	35.9
1980	75.0	59.4	50.2	40.5	42.1	38.7	42.0
1990			52.2	43.7	45.2	40.6	42.4
2000				44.7	48.6	47.6	44.9

Our projections of the future path of relative wages of women will probably prove to be too conservative. These projections are based on parameters and behaviors that are already in place in 1980. Essentially, we are assuming that women continue on their current life-cycle paths, paths that represent averages over the last thirty years. However, the early indications are that participation rates will continue to rise at the more rapid pace of the 1970s for the cohorts of women who first enter the labor market during the final 20 years of this century. Consequently, over the next 20 years, relative wages for women less than 30 years old should increase more rapidly than they will for older age groups. Similarly, women in cohorts who entered the labor force during the 1970s probably will have a deeper commitment to the labor market, characterized by higher levels and more continuity, than the future we project for them based on averages of past life-cycles.

More important, the increased length and continuity of women's future work experience should steepen wage-experience profiles. This is likely because of added incentives to invest in market-oriented skills and less skill obsolescence associated with absences from the labor force. If so, the historically based experience-wage coefficients used in our simulations are too low. All these considerations suggest that the gender wage gap should narrow even more than is indicated in Table 33.

THE WAGE INCREASE SINCE 1980

We have noted several times in this report that trends in the relative wages of working women increased during the 1970s. In particular, the increase since 1980 was spectacular and historically unique. The relative wage of women rose to 64 percent in 1983 from 1980's 60 percent level. It is premature to attempt a full analysis of the reasons for this change, but we discuss one relevant hypothesis below.

One explanation that can be easily dismissed is that this increase since 1980 can be attributed to government affirmative action pressures. The budgets and personnel of the two main government enforcement agencies, EEOC and OFCCP, have declined since 1980.[17] Title VII of the Civil Rights Act, which prohibited discrimination on the basis of race and sex, was passed in 1964, setting up the Equal Employment Opportunity Commission (EEOC) in 1965. The Office of Federal Contract Compliance Programs (OFCCP), which prohibited discrimination by government contractors, was amended by an executive order in 1967 to include sex discrimination. While lags in the power of these enforcement agencies is likely, it strains credulity to suppose that these effects would be felt after 1980, especially in a period of budgetary retrenchment by the enforcement agencies.

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[17] For documentation, see Smith and Welch (1984).

The forces that we have emphasized in this report are much more likely to be responsible for the wage increases that occurred in the last three years. We have seen that our model predicted that increases in work experience of the female workforce, which in fact characterized the last half of the 1970s, would accelerate during the 1980s and 1990s. In addition, the education of the female workforce has risen faster than the education of the male workforce. First, in recent years, women's education rose faster than males as increasing numbers of women attended and completed college. Second, increases in participation rates are now larger among more educated women than among less educated women.

To illustrate this last point, Table 34 lists women's labor force participation rates by education in 1979 and 1983. While labor force participation rates of college educated women have continued to rise, and in fact have done so at an accelerated rate, the labor force participation rates of less educated women have either remained stable or declined. Thus, the historical pattern of more rapid increases in female market participation among less educated women, which characterized the 1940-1970 time period, has revised to the point that participation rates have only increased in recent years for more educated women. Thus, we are passing through a mirror image of the past. The sample composition effects that in the past have hidden the real increases in women's wages are now exaggerating them.

CONCLUSION

In this section, we address the issue of why the reported wages of working women relative to men have remained constant over the last sixty years. This constancy is viewed as a puzzle because women's increasing participation in the workforce should have led to increases in their job-oriented skills and eventually their wages.

Our resolution required the construction of market-skill distributions for all post-World-War II labor market cohorts. These skill distributions had two dimensions: years of schooling and years of labor market experience. During the century, the education of the male population has actually been rising more rapidly than the education of the female population. If we compare people born between 1946 and 1950 with those born between 1911 and 1915, we find that men's average

Table 34

WOMEN'S LABOR FORCE PARTICIPATION BY EDUCATION

	Years of Schooling					
Year	0-7	8	9-11	12	13-15	16+
			Ages 20-24			
1979	38.0	44.9	47.6	73.4	67.7	86.7
1983	26.4	45.2	45.2	73.6	69.7	86.1
			Ages 25-34			
1979	38.0	42.9	49.9	61.9	67.4	76.6
1983	33.7	46.6	49.1	66.3	74.1	82.6
			Ages 35-44			
1979	42.5	47.1	55.4	65.6	67.2	68.1
1983	39.9	49.7	59.5	70.6	72.2	76.5
			Ages 45-54			
1979	41.7	48.4	50.3	60.6	65.6	71.6
1983	35.9	47.5	53.5	64.0	69.1	74.6
			Ages 55-64			
1979	29.8	33.9	39.1	46.4	50.2	51.7
1983	28.5	31.6	35.1	49.4	45.4	55.1

SOURCE: see Table 6.

schooling rose by 2.8 years, but women's by only 2.3 years. On this dimension, men's skills have increased faster than women's. This one-half year advantage in the increase in average schooling is due principally to the fact that men received college education in greater numbers and much earlier than women did.

This secular advantage in favor of men becomes even larger when we monitor trends in the education of the workforce. Between 1940 and 1970, more less-educated women than better-educated women entered the workforce. Because of this, the secular increase in schooling of the female workforce was less than the increase within the population of women. For example, among white *workers*, male schooling rose by almost one year more than that of female workers.

Because skills are acquired on the job as well as in schools, we also examined trends over time in the experience of the female workforce and population. This distinction between the workforce and population is even more critical when we examine the experience dimension of skill. As female participation rates have increased rapidly over time, many of the new workers in the labor force brought with them little or no prior work experience. Nonetheless, they become part of the labor-force base in computing average experience. Because of this, the average experience of the female workforce thus can decline even as women's total experience is rising.

In this section, we constructed distributions of work experience for all postwar labor market cohorts. Our estimates of experience were derived from a mover-stayer model of labor force transition that is a simple combination of Markov and heterogeneity models. Our model demonstrates that most of the secular increase in market participation by women over the postwar period was due to the entry into the labor force of women who were previously housewives with little prior experience. In contrast, it was not caused by greater continuity and longer duration of stay in the labor force by women who were members of the labor force. Despite the enormous increase in numbers of women working, women workers exhibit the same labor force attachment (the length of time they will stay in the labor market) in 1980 as in 1950. However, this situation is now in a period of rapid flux.

The consequence is that the average experience of the female workforce has changed little over the postwar period while the average labor market experience of all women is rising. For example, the average 40-year-old *working* woman in 1950 had 14 years of prior work experience. By 1980, the typical forty-year-old working woman had only 14.4 years of work experience, an increase of less than half a year in 30 years. In contrast, there was a significant increase in the average experience of 40-year-old women, calculated independently of whether they were currently working or not. The average 40-year-old woman in 1950 had 8.1 years of work experience; in 1980, the figure was 11.4, an increase of 3.3 years.

We next used these education and experience distributions to calculate the wages of the female workforce and the female population for all years between 1950 and 1980. In any year, the wages of all women will be less than the wages of currently working women for three reasons. First, working women have more education than women who are not working. Second, working women have more labor market experience than women who are not currently working. Third, for a host of other reasons, working women have more aptitude for work than nonworkers. Taking into account all three factors, we do find that women on average would receive a lower hourly wage than the wage paid to the women who are currently in the labor market. To summarize our findings, we estimate that the hourly wage of all women in 1980 was 53 percent of the hourly wage of men, whereas the figure for working women was 60 percent.

The most important implication of our model concerns not so much the difference in wage levels of all women compared with workers in any particular year, but the implication for secular trends in hourly wages of women. We know that the average wage of *working* women drifted downward slightly between 1950 and 1980. Using an hourly wage base, the hourly wage of working women was 63 percent that of men in 1950, compared with 60 percent in 1980. But this is consistent with our finding that relative to men, skills of the female workforce were higher in 1950 than in 1980. Compared with men, women workers lost one year of schooling and gained only half a year of work experience between 1950 and 1980. Thus, the stability in relative wages by sex among workers is consistent with the stability in their skills.

But the story is quite different when we monitor trends in the wages of all women. The skills of all women relative to all men were indeed increasing after 1950. While education of all women increased by half a year less than the education of men, there was a significant rise of 2 or 3 years in women's work experience. Converted to an hourly wage base, we estimate that in 1950 all women would have earned 48 percent as much as men. By 1980, this had risen to 53 percent. Therefore, a correct description of the relative wage series would show an increase in women's wage relative to men.

The next section of this section uses our model to predict the path of relative wages of women over the next twenty years, as well as our best guess of what those wages were in the decades before 1950. To do so, we calculated the experience and education distributions for all years between 1920 and the year 2000 among women who were in the labor market between 1950 and 1980.

Our description of the 1950-1980 period extends even more dramatically into the past. In fact, we find that snapshots of the female workforce in 1920 and 1930 would look amazingly similar to those in 1950 and 1980. Based on our simulations, the typical female worker in 1930 actually had more accumulated work experience (15.4 years) at age 40 than the average 40-year-old worker in 1980 (14.4 years). Because of this, our estimate of relative hourly wages of working women were about the same (63 percent) as in 1950.

The situation is far different when our attention shifts to all women. Between 1930 and 1980, there was almost a 5-year incremental gain in the total number of years worked for the average 40-year-old woman (from 6.7 years in 1930 to 11.4 years in 1980). Therefore, over the long term, women's wages have risen much faster than male wages. A rough calculation suggests that wages of all women were 0.43 percent those of males in 1920, 0.48 percent in 1950, and 0.53 percent in 1980. Over this period, women's wages increased 25 percent faster than male wages did.

What of the future? The future of reported women's wages for the workforce is going to be far different from what has occurred in the past. The average amount of work experience of both the female workforce and the population will increase significantly over the next 20 years. A 40-year-old working woman in 2000 will have 5.2 more years of work experience than a 40-year-old worker in 1980. As a result, we estimate that wages of working women will rise at least 15 percent faster than those of males. If we use the current ratio of 0.64 as a base, a conservative estimate would be that the wages of working women will be at least 74 percent of male wages by the year 2000. This is a conservative estimate, because the increase in women's commitment to the labor market over the next 20 years should also increase women's incentive to invest in market skills. This factor was not taken into account in our projection. Similarly, we estimate that wages of all women will rise relative to those of men, reaching (conservatively) at least 66 percent by the year 2000. This is 50 percent higher than the wage ratios that prevailed in 1920.

We conclude this section by examining reasons for the increase in women's wages between 1980 and 1983. In 1983, women's wages had risen to 64 percent of men's, from 60 percent three years earlier. One explanation that does *not* fit is that it is the consequence of government affirmative action pressures. If anything, the enforcement powers and the resources of the two principal government enforcement agencies, EEOC and OFCCP, have declined in the last three years.

The recent increase is consistent with the arguments we have advanced in this report, however. For the first time, the work experience of the female workforce has been increasing. In addition, the education of the female workforce has risen more rapidly than that of the male workforce. The latter is partly due to increased college attendance by women, but also because, in recent years, workforce participation rates have increased much faster among more educated women than among less educated women.

VI. THE POSTWAR INCREASE IN WOMEN'S WORK

This section summarizes our analysis of postwar changes in female labor supply, based on disaggregated time-series data across the period 1950-1981. Over this 31-year time span our observations consist of mean values, at single years of age, of labor supply, education, work experience, weekly wages, and fertility.[1] The data are arranged in the form of a set of life-cycle histories for individual birth cohorts.

We illustrate our cohort life-cycle format with alternative measures of female labor supply in Table 35. This table contains three definitions: annual hours worked by the average woman,[2] annual hours supplied by the average *working* woman, and weekly participation rates. Although work effort of the typical woman has risen a great deal since 1950, the amount of labor supplied by a randomly selected working woman has scarcely changed.[3] The discrepancy between the two annual hours series indicates that much of the expansion in female work involved participation decisions. In the third panel of Table 35, weekly participation exhibited the largest across-cohort increases in labor supply.[4]

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[1] For the subperiod 1967-1980, we used CPS micro files to calculate means at single years of age. Over the subperiod 1950-1966, CPS published tables exist on distribution of weeks worked and income. However, these published tables are provided only in 5-year and 10-year age groups. We smoothed this series using cubic spline approximation to obtain values at single years of age.

[2] Defined as Annual Participation Rate * Weeks Worked of Workers * Usual Hours Worked Per Week.

[3] When we separate annual hours, conditional on working, into its weeks and hours components, weeks worked per working female uniformly increase over the lifecycle, especially after age 35. Because the secular trend in conditional weeks is positive, the declining annual hours of the female workforce is largely the result of a shortening of the workweek by about three hours. The increased availability of part-time jobs, particularly for married women, may well have eased their entry into the labor market.

[4] Participation rates, either weekly or annual, understate the differences in labor supply between men and women. Despite weekly participation rates well over 60 percent, an average woman works well under half the number of hours of an average man.

Table 35

WOMEN'S LABOR SUPPLY BY BIRTH COHORTS

	Birth Cohort						
Age	1902	1910	1918	1926	1934	1942	1950
Annual Hours Worked by Women							
16					169	139	118
20					861	639	837
25				716	656	784	974
30				627	626	709	1081
35			686	679	800	924	
40		723	765	832	930		
45		859	895	942	1084		
50	774	914	900	895			
55	789	877	929	924			
60	742	765	693				
64	639	375					
Annual Hours Supplied by Working Women							
16					485	368	298
20					1339	927	1136
25				1416	1285	1382	1426
30				1402	1296	1328	1480
35			1479	1379	1352	1391	
40		1496	1456	1471	1483		
45		1591	1506	1531	1554		
50	1627	1565	1636	1524			
55	1580	1605	1726	1600			
60	1620	1511	1620				
64	1633	1294					
Weekly Participation Rates							
16					15.5	14.0	15.5
20					40.9	43.7	52.8
25				35.8	34.6	42.2	55.3
30				32.5	32.7	42.2	62.3
35			38.4	34.0	43.2	54.1	
40		38.2	41.6	44.6	51.1		
45		42.6	47.5	50.9	59.2		
50	40.0	46.7	50.0	51.4			
55	39.2	46.4	47.4	50.9			
60	35.2	43.9	41.4				
64	27.7	19.2					

These profiles indicate that female labor supply varies considerably not only across cohorts, but also over life-cycles within birth cohorts. We require a statistical approach that can disentangle these distinct life-cycle and cohort movements. In addition, the fundamental insight of the life-cycle approach--that market hours at any age depend not only upon variables specific to that age (wages, family composition) but also on values exhibited at all points in the lifecycle--also raises the principal statistical difficulty. At the most general level, the researcher must know the entire stream of past and future prices and incomes, and complete retrospective and prospective fertility behavior. However, work by Heckman and MaCurdy (1980) suggests a considerable econometric simplification that greatly eases the computational burden. We may write the labor supply function

$$(1)\quad \ell n\ h_i(t) = f_i + \zeta_i\ \ell n w_i(t) + \zeta_2\ \ell n w_i(t) + \zeta_3\ X_i(t) + \zeta_4(r - \alpha) + u_i(t)$$

where $X_i(t)$ represents a vector of variables altering household marginal products or tastes, and f_i are unobserved individual specific (or cohort-specific in our case) fixed effects that are a surrogate for all lifetime measures outside of the current period.

Reduced to its simplest form, Heckman and MaCurdy suggest a labor supply equation that in the first stage includes contemporaneous values of wages of women and men ($\ell n w^1(t)$ and $\ell n w^2(t)$), determinants of household productivity, age, and a set of dummy variables for each individual (each cohort in our implementation). ζ_1, the parameter of the contemporaneous wage, is a direct estimate of the intertemporal substitution effect, a response to a pure evolutionary life-cycle variation in wages. Similarly, the age coefficient captures the Fisherian interplay between interest rates and time preferences. If interest rates exceed rates of time preference, as most empirical estimates imply, the intercept will be negative. Contemporaneous values of family composition capture the effect of nonmarket productivity.

Similarly, life-cycle profiles at fertility would follow the path

$$(2)\quad \ell n\ b_i(t) = g_i + \alpha_1\ \ell n\ w^1(t) + \alpha_2\ \ell n\ w^2(t) + \alpha_3 f(t) + v(t),$$

where $b_i(t)$ represents age-specific fertility rates, g_1 are cohort-specific fixed effects, and $f(t)$ is a generalized function of time (age) meant to subsume effects due to fecundity. Estimation of these labor supply and fertility equations are facilitated by taking first differences in these equations. The purpose of these change regressions is to isolate intertemporal substitution effects.

The second step in our procedure consists of a regression of our estimated fixed effects on a set of variables partly representing lifetime budget constraints. In both the fertility and labor equations, we estimate fixed effects as

$$(3) \quad f_i = \ell n\, h_i(t) - (\zeta_1 \ell n\, W^1(t) + \zeta_2 \ell n W^2(t) + \zeta_3\, Y_i(t) + \zeta_4\, (r - \alpha)).$$

Our aim with these fixed effect equations is to simulate the predicted cohort growth in female labor supply induced by parametric shifts in wages profiles across cohorts. The shifts that occur can be quite complex, altering levels and curvature of wage profiles. Moreover, what matters are cohorts' expectations about future shifts and how these expectations are formed. In our empirical implementation, we step aside from a full solution and adopt a more pragmatic approach. In our fixed-effect regressions, we include as regressors five-year lags in female and in male wages, and an age quadratic to fix the life-cycle point. We are implicitly assuming that the last five years contain sufficient information for a cohort to project its future wage path. In addition, to simulate parametric wage shifts, we only use the sum of the coefficients on the five-year wage lags. Thus, we are assuming in our simulations that an equal proportional increase in wages in each of the last five years is converted by a cohort into a uniform shift in its expected wage profile. Finally, from Eq. (1), we know that the total effect of a parametric wage change can be obtained by adding our estimated wage elasticities from the change and fixed-effect regressions.

The final methodological issue we address concerns joint determination of labor supply and fertility. There is a long tradition of including fertility variables as regressors in labor-supply equations. This assumed exogeneity is particularly untenable when interest centers on estimating the effects of wage growth on long-term labor supply. We take two approaches here. The first follows the existing literature and conditions on current fertility levels. Wage elasticities estimated are partial effects in that they do not include the fertility adjustments induced by wage shifts. In the second approach, we implicitly recognize the simultaneous nature of fertility and labor supply by not conditioning on fertility. These reduced-form parameters provide estimates of the total effect of wages on labor supply, including any indirect effects through fertility.

The first step in our empirical investigation involved the estimation of the wage function for women as described in the previous section.[5] The purpose was to supply instruments into subsequent labor supply and fertility regressions and to adjust observed time trends in the relative wage rates of women for some serious distortions caused by the entry of women into the labor market.

Tables 36 and 37 contain our change regressions for labor supply and for fertility. The dependent variable in Table 36 is the change in the ℓn annual hours worked of all women within a cohort from one age to the next. Similarly, all regressors are first differences within cohorts.[6] The first difference equation does not do great violence to the theory. Conditioning on fertility, a one percent increase in the mean wage of the female population over the life cycle leads to a 0.43 percent increase in female hours worked.[7] Because this coefficient estimates an intertemporal substitution effect, a positive coefficient is encouraging. Purely evolutionary variation in the male wages has little effect on female labor supply.[8] The negative intercept in Table 36

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[5] The dependent variable was the ℓn female weekly wage within each cohort from one age to the next. The regressors are also within-cohort first differences of mean education and work experience (as a quadratic). We attempt to capture year effects by controlling for the average male wage in each year. All nominal values are expressed in 1964 dollars.

[6] We are ignoring an array of endogeneity issues in including the marital and school enrollment dummies.

[7] Smith (1977) reports a coefficient of 0.56 for this elasticity, using quite different data.

[8] We interact male wages with the proportion married on the presumption that male income affects female labor supply only in married families.

Table 36

DEPENDENT VARIABLE: ℓn LABOR SUPPLY
(First Difference Within Cohorts)

Variable	Coefficient			
Δ Adjusted ℓn female wage in population	0.4328	1.632		
	(2.71)	(7.58)		
Proportion married[a] * Δ ℓ male wage	0.0655	-.6139		
	(0.79)	(5.62)		
Δ Cumulative fertility[a]	-.01337			
	(16.45)			
Δ No. of children less than 3[a]	.04862			
	(3.83)			
Δ No. of children less than 6[a]	-0.7571			
	(-11.68)			
Δ Proportion married		0.0033	-.1104	
	(0.02)	(.50)		
Δ Proportion single		(-1.0581)	-.375	
	(-6.10)	(1.64)		
Δ Proportion enrolled in school		(-1.3243)	-1.407)	
	(-36.01)	(28.01)		
Intercept		-0.0235		-.0438
	(-4.03)	(5.34)		
R^2	.761	.538		

[a] All variables are lagged.

supports previous estimates of Ghez and Becker (1975), Smith (1977), and MaCurdy (1981) that interest rates exceed rates of time preference.[9] Our lagged fertility variables deliver conventional results. Children, especially while they are young, reduce labor supply. In the second equation in Table 36, we drop these fertility controls. Although the magnitude is large, the direction of change in the wage elasticities was expected. Intertemporal substitution is larger when we do not condition on fertility. The negative male wage coefficient may indicate that rising male wages over the life-cycle reduce female labor supply through family size. Because of the relaxation of credit constraints, the family may initiate childbearing.

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[9] The most troublesome variable is clearly the proportion single. At this point, we have the rather peculiar result that a decrease in the fraction of women who were never married increases labor supply. As a matter of pure curve fitting, there are aspects of the rapid rise in hours at young ages that we are not capturing with our controls. This increase in hours is being picked up by the proportion single.

The dependent variable in Table 37 is the first difference within cohorts in age-specific birthrates. The parameter estimates are conventional--showing large negative elasticities with respect to female wages and smaller elasticities with respect to male wages. There is a considerable positive effect of the current stock of children on current fertility rates. An economies-of-scale argument may apply, where the presence of young children lowers the cost of an additional child.

Table 37

DEPENDENT VARIABLE: ℓn BIRTH RATE
(First Differe   Within Cohort)

Variable	Coefficient	
Δ Adjusted ℓn female wage in population	-0.7460 (-3.94)	-.6343 (3.21)
Proportion married * Δn ℓn male wage	0.1819 (1.75)	.0830 (.82)
Δ Cumulative fertility	0.1596 (2.07)	
Δ No. of children less than 3	1.0782 (7.99)	
Δ No. of children less than 6	-0.3791 (-5.11)	
Age	-0.0141 (-15.40)	.0043 (2.31)
Age^2	-.0003 (2.32)	
Δ Proportion married	0.1894 (1.03)	.3745 (2.04)
Δ Proportion single	0.1051 (-0.46)	-.8786 (3.82)
Intercept	0.3208 (8.63)	-.0005 (.01)
R^2	0.821	.804

We next turn to our wage effects estimated from the second-stage, fixed-effects regressions. Table 38 lists our elasticities and "t" statistics derived from the sum of the 5-lagged wage coefficients. In our labor supply equations, such elasticities are computed with and without fertility controls.[18] In the marginal utility of wealth constant framework, increases in wages should reduce the marginal

Table 38

SUMMARY OF ESTIMATED WAGE EFFECTS

Wages	Labor Supply	Fertility
A. Wage Elasticities from Fixed Effects		
A. *Fertility Conditioned*		
Σ ℓn female wages	-.0823	
	(2.74)	
Σ ℓn male wages	-.2591	
	(10.8)	
B. *Not Fertility Conditioned*		
Σ ℓn female wages	-.8092	-1.192
	(108.4)	(22.8)
Σ ℓn male wages	.0945	-.1019
	(6.95)	(2.49)
B. Total Wage Elasticities		
A. *Fertility Condition*		
Female wage	.3505	
Male wage	-.1936	
B. *Not Fertility Conditioned*		
Female wage	.8228	
Male wage	-.5194	

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[18] In specifying the fertility controls, we appeal to a similar argument to that used for the wage variables. What is relevant is the cohort's expectation of its future fertility. We assume that these expectations are formulated from the last five years' birthrates. Because of the life-cycle biological constraints on fertility, we also interact these five-year lags with age.

utility of wealth and therefore labor supply. Conditional on fertility, estimated elasticities for both male and female wages are indeed negative.[11] As expected, labor supply responses to female wages are greater when we do not control for fertility.[12] In our fertility fixed effect regressions, wage elasticities are both negative and especially large for female wages.

These change and fixed-effect elasticities are intermediate products. It is the sum of the two elasticities that measures the response of labor supply and fertility to across-cohort wage growth. In the bottom panel of Table 38, we list these wage elasticities. If male and female wages increase at the same rate over time, the total labor-supply growth induced by one percent real wage growth across cohorts is 0.16. If we allow fertility to respond, the long-term real wage elasticity is 0.30. Thus, about half of the female labor supply response to an increase in wages works through declining fertility.

How much of the secular growth in female labor supply over the postwar period can be accounted for by the growth in real wages? The ingredients to answer that question are provided in Table 39. Over the postwar period, the average (across all age cells) increase in women's labor supply was 40 percent. Our fertility-conditioned wage elasticities predict average labor supply growth of 11 percent, and the full unconditioned prediction is 23 percent. With all fertility induced effects included, real wage growth "explains" 58 percent of the postwar increase in female labor supply.

If our estimates are reasonable, real wages do indeed explain a considerable part of the postwar increases in female labor supply. But they clearly do not explain all of it, and we would frankly be incredulous if they did. What other factors may have contributed?

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[11] The larger absolute size of the male wage coefficient may reflect the larger wealth increases associated with male wages due to their greater hours worked.

[12] The positive estimate for male wages with no fertility control results from permanent increases in male income reducing fertility and hence increasing labor supply.

Table 39

ACCOUNTING FOR CHANGES IN FEMALE LABOR SUPPLY: 1950-1980

Item		Weekly Female Wages (20-64)	Weekly Male Wages (20-64)
1950		39.4	88.0
1980		70.8	142.4
Percentage change in (1950-1980)		58.6	48.1
Labor supply change predicted by wage growth	(unconditional)	48.2	-25.0
	(conditional)	20.5	-9.3
Total labor aupply predicted change	(unconditional)	23.3	
	(conditional)	11.2	
Actual percentage change		40.3	

First, other causes of declining fertility that do not operate through wages are clearly relevant. For example, exogenous fertility declines induced by new contraceptive technologies may be important not only directly but also because they enable women to time their career withdrawals more finely. Second, rising schooling level at one end and Social Security at the other age extreme have served to congest labor supply into the age intervals we investigate here, exaggerating the true time-series growth. Rising levels of marital instability may be important, especially for the very rapid increases during the last decade.[13] Finally, changing attitudes towards women's work may well have an independent role to play.

In this section, we discussed our analysis of the reasons for the increase in the numbers of women who worked during the postwar years. Almost all the increase in women's work since 1950 is a result of the increasing proportion of women who have entered the workforce. The average number of hours worked by the typical working woman has not changed, however, mainly because of an increase in the fraction of women who work part-time. Thus, despite weekly participation rates in excess of 60 percent, the average working woman still works under half the number of hours of an average man.

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[13] A wage explanation is obviously not complete during the last decade, since real wage growth was below normal rates, while female labor supply was above normal rates. However, we caution against excessive pessimism because the increase in real wages during the 1970s is probably both less than women anticipated and less than what they will receive over their remaining lifetime.

Based on our model, we estimate that women will work more when their wages are high. Holding family size constant, a one percent increase in women's wages will increase their labor supply by one-third of one percent. This effect is much larger when we allow family size to adjust to the higher wage. Our estimates indicate that an increase in women's wages decreases the number of children. This decrease in family size also leads to more work by women. If we allow for this effect, a one percent increase in women's wages increases women's labor supply by eight-tenths of one percent. In contrast, we find that women are less likely to work as their husband's wages increase. However, the depressing effect of husband's wages on women's labor supply is much smaller than the encouraging effect of an increase in women's wages. Thus, as real wages rise over time, female labor supply should rise.

On the basis of our work in this section, we conclude that real wages have played a significant part in the growth of the female workforce. One reason is that the postwar real wage growth among women has been much larger than commonly believed. Over the last three decades, the combined effect of rising male and female wages explains almost 60 percent of the total growth in the female labor force. Half of this wage effect reflects the fact that incentives to work are greater when wages are high. The other half reflects the fact that high female wages have encouraged women to have smaller families. Smaller families reduce the demands on women's time, freeing women for greater participation in the market.

REFERENCES

Bancroft, Gertrude, *The American Labor Force*, New York: John Wiley and Sons, 1958.

Bowen, William, and T. Aldrich Finegan, *The Economics of Labor Force Participation*, Princeton, N.J.: Princeton University Press, 1969.

Durand, John D., *The Labor Force in the United States, 1890-1960*, New York: Social Science Research Council, 1948.

Employment and Earnings, U.S. Department of Labor, Bureau of Labor Statistics, Washington, D.C., January 1984.

Employment and Training Report of the President, U.S. Department of Labor, Employment and Training Administration, Washington, D.C., 1982.

Ghez, Gilbert, and Gary Becker, *The Allocation of Goods and Time Over the Life Cycle*, New York: Columbia University Press, 1975.

Goldin, Claudia, "The Changing Economic Role of Women: A Quantitative Approach." *Journal of Interdisciplinary History* Vol 13, No. 4, pp. 707-733. (Spring 1983)

Heckman, James J., "Heterogeneity and State Dependence," in Sherwin Rosen (ed.), *Studies in Labor Markets*, National Bureau of Economic Research, 1981.

Heckman, James J., and Thomas E. MaCurdy, "A Life Cycle Model of Female Labor Supply," *Review of Economic Studies*, Vol. 47 (January 1980), pp. 47-74.

Heckman, James J., and Robert Willis, "A Beta Logistic Model for the Analysis of Sequential Labor Force Participation of Married Women." *Journal of Political Economy*, Vol. 85 (February 1977), pp. 27-58

Long, Clarence, *The Labor Force Under Changing Income and Employment*, Princeton, N.J.: Princeton University Press, 1958.

MaCurdy, Thomas E., "An Empirical Model of Labor Supply in a Life-Cycle Setting," *Journal of Political Economy*, Vol. 89, No. 6 (December 1981), pp. 1059-1085.

Mincer, Jacob, "Labor Force Participation of Married Women," in H. G. Lewis (ed.), *Aspects of Labor Economics*, Princeton, N.J.: Princeton University Press, 1962, pp. 63-105.

O'Neill, June, "The Trend in the Sex Differential in Wages," unpublished paper.

Smith, James P., "Family Labor Supply Over the Life Cycle," *Exploration in Economic Research*, National Bureau of Economic Research, Vol. 4, No. 2. (Spring 1977), pp. 205-276.

Smith, James P., "Race and Human Capital," *American Economic Review*, Vol. 74, No. 4, September 1984, pp. 685-699.

Smith, James P., *Female Labor Supply: Theory and Estimation*, Princeton, N.J.: Princeton University Press, 1980.

Smith, James P., and Michael P. Ward, "Time Series Growth in the Female Labor Force," *Journal of Labor Economics* (forthcoming).

Smith, James P., and Finis Welch, "Affirmative Action and Labor Markets," *Journal of Labor Economics*, Vol. 2, No. 2, April 1984, pp. 269-298.